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ROYAL BOTANIC GARDENS, KEW

XX—A LIST OF TRUE AND FALSE MAHOGANIES.

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The first accounts of mahogany were given by early explorers shortly after the discovery of America. The value of the wood for repairing ships was soon appreciated, Cortez using it for this purpose in 1521 and Sir Walter Raleigh in 1597. The timber did not reach Great Britain until much later. In 1724 a small quantity was received by Dr. Gibbons of Covent Garden, who had a candle-box made of the wood. This was much admired by the Duchess of Buckingham and under her patronage the wood quickly became fashionable. By 1750 Chippendale was making great use of it and especially of the beautifully figured pieces from crotches.

Up to the year 1845 the trade in mahogany was restricted by the imposition of heavy import duties. Following their removal, the wood gradually took its place as the most popular in the Victorian age for furniture and cabinet making. By 1880 the demand had outstripped the supply and efforts were being made to introduce the tree to a number of tropical stations in the Empire. Kew played an important part in this work by acting as a distributing centre for seeds. Many of the plantations were successful, especially those of *Swietenia macrophylla* in India. While the work of planting was in progress a search for substitutes was made which resulted by 1890 in the importation of considerable quantities of "mahogany" from West Africa. Much of this timber was the product of species of *Khaya* and *Entandrophragma*, closely related botanically to the true mahoganies. The introduction of new substitutes for mahogany has continued with unabated activity up to the present day and their identification now presents a difficult problem to all interested in timbers.

In the following list the true mahoganies are enumerated, followed by nearly 200 species which have been described as mahogany, with or without qualification. These are arranged, first under their families, 35 of which are represented from all parts of the tropic and temperate zones, and then in alphabetical sequence of the common names. Synonyms are included only if they have been used in the works consulted, and are placed in brackets below the accepted names. A few common names in frequent use have been included in addition to the mahogany names, but the list is not exhaustive in this respect. The sources of information are indicated by arabic numerals referring to the bibliography. In the list of com-

mon names, roman numerals refer to the families in the systematic section. Species represented by a wood specimen in the Museums of Economic Botany at Kew are distinguished by an asterisk.

THE TRUE MAHOGANIES (MELIACEAE)

**Swietenia Mahagoni* Jacq. Spanish Mahogany. W. Indies. 16.
**S. macrophylla* King. Honduras Mahogany. C. America. 16.
S. Candollei Pittier. Venezuelan Mahogany. Venezuela. 16.
**S. humilis* Zucc. Mexican Mahogany. Mexico. 16.
(*S. cirrhata* Blake). Mahogany. Mexico. 16.
S. Krukovii Gleason. Mahogany. Brazil. 5a.

FALSE MAHOGANIES

I. DILLENIACEAE

**Curatella americana* L. Acajou Bâtard (Bastard Mahogany). French Guiana. 14.

II. FLACOURTIACEAE

**Kiggelaria africana* L. Natal Mahogany. Natal. 19.
(*K. Dregeana* Turcz.)

III. VOCHYSIACEAE

**Vochysia hondurensis* Sprague. White Mahogany. British Honduras. 14.

IV. GUTTIFERAE

**Calophyllum Inophyllum* L. Borneo Mahogany. Alexandrian Laurel. India, Burma. 13, 24.
C. antillanum Britton. Chijole Mahogany. Tropical America.
(C. Calaba Jacq.). Santa Maria Mahogany. 13, 15, 24.
**C. Calaba* L. Fiji Mahogany. Fiji, Ceylon.
(*C. Burmanni* Wight). 14.
**C. spectabile* Willd. Fiji Mahogany. Fiji, Burma. 14.
**C. tomentosum* Wight. Satin Mahogany, Poon. India, Ceylon. 20.
C. costatum F. M. Bailey. Satin Mahogany, Red Touriga. Queensland. 20.
C. australianum F. v. M. Satin Mahogany, Red Touriga. Queensland. 20.
C. Touriga C. T. White & Francis. Satin Mahogany, Brown Touriga. Queensland. 20.
**C. brasiliense* Camb. Mahogany, Jacariuba. Brazil. 13.
Ochrocarpus africanus Oliv. Bastard Mahogany. Liberia. 14, 23.
Garcinia sp. Mahogany. Liberia. 23.

V. THEACEAE

Caraipa grandiflora Mart. Mahogany. Brazil. 13.

VI. DIPTEROCARPACEAE

**Shorea robusta* Gaertn.f. E. Indian Mahogany, Sal. India. 7, 3.
S. polysperma (Blanco) Merr. Bataan Mahogany. Philippine Is. 13, 14, 24, 18.
S. negrosensis Foxw. Philippine Mahogany, Red Lauan. Philippine Is. 13, 14, 18, 24.
S. Curtisii Dyer. E. Indian Mahogany, Seraya. Malay, Borneo. 7.

Dipterocarpus sp. Philippine Mahogany, Apitong. Philippine Is. Malay. 7.

VII. MALVACEAE

**Hibiscus elatus* Sw. Blue Mahogany, Blue Mahoe. West Indies. 15.

VIII. STERCULIACEAE

Tarrietia sylvatica (Vid.) Merr. Philippine Mahogany. Philippine Is. Cochin China. 13, 24.

T. javanica Blume. Philippine Mahogany. Philippine Is. Cochin China. 13, 24.

(*T. cochinchinensis* Pierre). Acajou du Gamboge. 14.

**T. utilis* Sprague. African Mahogany. Gold Coast, Liberia. 9, 14.

(*Cola proteiformis* A. Chev.) Acajou résineux (Resinous Mahogany). Ivory Coast. 14.

Cola cauliflora Mast. Cola Mahogany. Nigeria. 23.

IX. TILIACEAE

**Pentace burmanica* Kurz. Burma Mahogany, Thitka. Burma. 11, 7, 24.

P. Griffithii King. Burma Mahogany. Burma. 7.

Cistantherapap averifera A. Chev. False Hill Mahogany. Nigeria. 23.

X. HUMIRIACEAE

**Saccoglottis gabonensis* Urban. Mahogany. Liberia. 14, 23.

(*Aubrya gabonensis Baill.*) Brass Mahogany Bark Tree. Nigeria. 6, 23.

XI. SIMARUBACEAE

**Simaruba amara* Aubl. Acajou Blanc. (White Mahogany). Guadeloupe. 14.

**Irvingia gabonensis* Baill. Duika Mahogany (possibly). Cameroons. 23.

(*I. Barteri* Hook.f.)

XII. BURSERACEAE

Canarium Mansfeldianum Engl. Edjun Mahogany. Nigeria. 23, 24.

C. Schweinfurthii Engl. Gaboon Mahogany. Nigeria, C. Africa. 14, 23.

C. euphyllum Kurz. Indian White Mahogany, White Dhup. Andaman Is. 4, 11, 14.

Santiriopsis Klaineana Pierre. White Mahogany. Nigeria. 13, 24.

**Aucoumea Klaineana* Pierre. Gaboon Mahogany, Okoumé. Gaboon. 7, 24.

("*Boswellia Klaineana*"). Libreville Mahogany. 13.

**Protium altissimum* March. Mahogany, White Cedar. Guiana. 3.

XIII. MELIACEAE

**Entandrophragma Candollei* Harms. African–, Scented Mahogany. Tropical W. Africa. 13, 23.

(*E. ferrugineum* A. Chev.). 23.

**E. utile* Sprague. African–, Cedar Mahogany, Sapeli. Tropical W. Africa. 14, 23.

(*Pseudocedrela utilis* Dawe & Sprague). 13.

E. macrophyllum A. Chev. African–, White Mahogany, Tiama. Trop. Africa. 14, 23.

**E. cylindricum* Sprague. Cedar Mahogany, Penkwa. Trop. W. Africa. 14, 23.
(*E. rufum* A. Chev.). 23, 24.
(*Pseudocedrela cylindrica* Sprague). 13.
**E. septentrionale* A. Chev. Brown Mahogany. Gold Coast. 14, 23.
E. excelsum Sprague. W. African Mahogany. Trop. W. Africa. 24.
*(*Pseudocedrela excelsa* Dawe and Sprague). 13.
E. caudatum Sprague. African Mahogany. Trop. W. Africa. 23, 24.
(*Pseudocedrela caudata* Sprague).
E. Pierrei A. Chev. Gaboon Mahogany, Obega. Gaboon. 14, 24.
E. Rederi Harms. Cameroon Mahogany. Cameroons. 14, 23.
E. Bussei Harms. Mbolo Mahogany. W. Africa. 24.
E. angolense (Welw.) C. DC. Quibaba da Queta Mahogany. Angola. 13, 14.
(*Swietenia angolensis* Welw.).
E. tomentosum A. Chev. Acajou Aboudikro (Aboudikro Mahogany). Ivory Coast. 14.
Pseudocedrela Kotschyi Harms. Hard Cedar Mahogany. French Sudan, Nigeria. 13, 14, 23.
**Khaya senegalensis* A. Juss. Benin–, Togo–, African Mahogany. Sudan, Uganda. 7, 23, 24.
(*K. Kerstingii* Engl.). Cameroons. 24.
**K. anthotheca* C.DC. Gaboon–, White Mahogany. Nigeria, Ivory Coast. 13, 23, 24.
(*K. agboënsis* A. Chev.). Acajou Blanc. Ivory Coast. 14.
(*K. euryphylla* Harms). 13, 23, 24.
**K. ivorensis* A. Chev. Red–, Lagos–, Grand Bassam–, African Mahogany. Ivory Coast to Gaboon. 23, 24.
(*K. Klainei* Pierre ex Pell.). 13, 23, 24.
K. grandifoliola C.DC. Benin–, Big Leaf Mahogany. Fr. Guinea to E. Sudan.
(*K. grandifolia* Stapf). 23, 24.
*(*K. grandis* Stapf). 13, 23, 24.
(*K. Punchii* Stapf). 13, 23, 24.
K. caudata Stapf. African Mahogany. Gold Coast. 14, 23.
K. madagascariensis Jum. & Perrier. Madagascar Mahogany. Madagascar. 24.
**K. nyasica* Stapf. Rhodesian Mahogany. Rhodesia, C. Africa. 14.
Guarea Thompsonii Sprague & Hutch. Bossé–, Cedar–, Scented Mahogany. S. Nigeria, Gold Coast. 6, 14, 23.
**Guarea glabra* Vahl. Acajou (Mahogany). S. America. Mus. Kew.
G. cedrata Pellegr. Bossé–, Pink Mahogany. Ivory Coast. 14.
G. africana Welw. Satin Mahogany. Liberia. 14, 23.
G. glomerulata Harms. Scented Mahogany. Cameroons, Nigeria. 14, 23.
Cabralea sp. Bastard Mahogany. Brazil. 24.
Trichilia Prieuriana A. Juss. Benin–, Lagos Mahogany. Cape Verde to Congo. 13.
**T. emetica* Vahl. Natal–, Cape Mahogany. Trop. Africa. 3, 6, 14.

**Lovoa Klaineana* Pierre. Brown Mahogany, African Walnut. Gold Coast, Nigeria. 14.

**L. Swynnertonii* E. G. Baker. Brown Mahogany. C. Africa. 14.

**Cedrela odorata* L. Indian Mahogany, Cedar. Cuba. 13, 24.

**C. Toona* Roxb. Australian Mahogany, Red Cedar. India, Australia. 3, 13.
(*Toona ciliata* Roem.) 14, 24.
(*C. australis* F.v.M). Australian Mahogany, Red Cedar. Australia. 3.
(*Toona australis* (F.v.M.) Harms). 24.

C. serrata Royle. Australian Mahogany. India, Ceylon. 3.
(*Toona serrata* Roem.) 14.

**C. fissilis* Vell. Acajou Wood (Mahogany Wood). Brazil.

C. guianensis A. Juss. Acajou de Cayenne (Cayenne Mahogany). Fr. Guiana. 14.

**C. sinensis* A. Juss.
(*Toona sinensis* Roem.). Acajou de Chine (Chinese Mahogany). E. Asia. 14.

**Carapa guianensis* Aubl. Demerara–, Brazilian Mahogany. British Guiana. 13, 14, 23.

**C. procera* DC. Brazilian Mahogany. W. Africa, W. Indies, Guiana. 14, 23, 24.
(*C. Gogo* A. Chev.). Gogo Mahogany, African Mahogany. 14, 24.
(*C. velutina* C.DC.). Gogo Mahogany, African Mahogany. 24.
(*C. guyanensis* Oliv.)
(*C. guineensis* G. Don).

C. surinamensis Miq. British Guiana Mahogany. Surinam. 14.

C. sp. (*Xylocarpus* sp.). African Mahogany. E. Africa. 14.

Ptaeroxylon obliquum (Thunb.) Radlk. Cape Mahogany, S. Africa. 14, 24.

Chuckrasia tabularis A. Juss. E. Indian Mahogany. Chittagong Wood. India, Burma. 24.

Melia composita Willd. Indian Mahogany. India. 13, 24.

**M. Azedarach* L. Acajou Rose du Tonkin (Tonkin Rose Mahogany). Indo-China. 14.

M. dubia Cav. Ceylon Mahogany, Lunumidella. Ceylon. 19a.

**Synoum glandulosum* A. Juss. Australian–, Scrub Mahogany. Queensland, N.S.W. 24.

Aglaia gigantea Pellegr. Annam Mahogany. Annam. 14.

**Dysoxylum Fraseranum* Benth. Rose–, Australian Mahogany. Australia. 13, 24.
(*D. Lessertianum* Benth.). Rose Mahogany. 3.

**D. Muelleri* Benth. Miva Mahogany, Red Bean. Queensland. 20.

D. cerebriforme F. M. Bailey. Miva Mahogany. Queensland. 20.

D. Pettigrewianum F. M. Bailey. Spur–, Rose Mahogany. Queensland. 20.

**D. spectabile* Hook.f. New Zealand Mahogany. New Zealand. 14.

**Soymida febrifuga* A. Juss. E. Indian Mahogany. Ceylon. 7, 13, 24.

XIV. Rhamnaceae

Zizyphus vulgaris Lamk. Acajou d'Afrique (African Mahogany). Tunis. 14.

XV. Anacardiaceae

Rhus integrifolia (Nutt.) Benth. & Hook.f. Mahogany, W. Sumach. California. 13.

Anacardium Rhinocarpus DC. Panama Mahogany. Central and S. America. 13, 14, 15.

**A. occidentale* L. Acajou (Mahogany). S. America. 14.

Mosquitoxylum jamaicense Krug. & Urb. Wild Mahogany. British Honduras. 14.

Melanorrhoea laccifera Pierre. Mahogany. Indo-China. 14.

M. Maingayi Hook.f. Straits Mahogany. Malaya, Sunda. 14.

Oncocarpus vitiensis A. Gray.
(*Semecarpus atra* Vieill.). Acajou Blanc (White Mahogany). New Caledonia. 14.

Antrocaryon Klaineanum Pierre. White Mahogany. Cameroons. 14.

Lannea Welwitschii Engl. Acajou Magona (Magona Mahogany). Cameroons. 14.

XVIa. Leguminosae : Papilionaceae

**Pterocarpus indicus* Willd. Indian–, Philippine Mahogany, Padouk. India, Malay. 13, 24.

**P. dalbergioides* Roxb. Tenasserim–, E. Indian Mahogany. E. Indies. 7, 13.

P. macrocarpus Kurz. Tenasserim Mahogany. Burma. 14.

**Swartzia tomentosa* DC. Horseflesh Mahogany. S. America. 13, 24.

Lonchocarpus laxiflorus Guill. & Perr. African Mahogany. Nigeria. 23.

L. sp. (probably *Peltophorum* sp.) Mountain Mahogany. Sierra Leone. 23.

XVIb. Leguminosae : Caesalpinieae

**Afzelia africana* Smith. African Mahogany, Aligna. Nigeria. 13, 23, 24.

A. bracteata T. Vogel. Konta Mahogany, Aligna. Liberia. 13, 23, 24.

**A. quanzensis* Welw. Rhodesian Mahogany. Rhodesia. 6, 14.

Brachystegia eurycoma Harms. Mahogany. Nigeria. 2.

**Detarium senegalense* Gmelin. Detarr Mahogany. Trop. W. Africa. 6, 13, 23.

"*D. guineense.*" Hard Mahogany. Cameroons. 23.

Didelotia africana Baill. Mahogany. S. Nigeria. 2.

**Copaifera coleosperma* Benth. Rhodesian Mahogany. S. Rhodesia. 14.

Dialium Staudtii Harms. Mahogany. Nigeria. 2.

Poeppigia excelsa A. Rich. Mahogany, Abey. San Domingo. 7.

**Gymnocladus dioica* Koch. Mahogany, Coffee Tree Mahogany. N. America. 13, 24.

Bauhinia candicans Benth. Caoba Falsa (False Mahogany). Argentine 14.

Caesalpinia sp. Horseflesh Mahogany. W. Indies. 14, 24.

Peltophorum adnatum Griseb. Horseflesh Mahogany. W. Indies. 15.
Daniellia caudata Craib. Mahogany. Nigeria. 23.
**Tamarindus indica* L. Madiera Mahogany. W. Indies, Florida. 13.
Erythrophleum sp. Iron Mahogany. Australia. 14.
**Hymenaea Courbaril* L. Mahogany. S. America. 3.
Gossweilerodendron balsamiferum Harms. Pink Mahogany. Nigeria, Congo. 14.

XVIc. Leguminosae : Mimoseae

**Piptadenia africana* Hook.f. White Mahogany. Trop. W. Africa. 24.
Enterolobium cyclocarpum Griseb. Juana Costa Mahogany. Trop. America 14.
Acacia Koa A.Gray. Mahogany. Philippine Is. 3.
**Lysiloma Sabicu* Benth. Cuba Mahogany, Sabicu. W. Indies. 3, 13, 15.
Pithecellobium arboreum (L.) Urb. Cuba Mahogany, Sabicu. W. Indies. 13.
Plathymenia reticulata Benth. Brazilian–, Yellow Mahogany. Brazil. 14, 15.
P. foliolosa Benth. Brazilian–, Yellow Mahogany. Brazil. 14.
(*P. foliosa* Benth.). 14.
Wallaceodendron celebicum Koord. Derham Mahogany. Philippine Is. 14, 15.

XVII. Rosaceae

**Cercocarpus ledifolius* Nutt. Bay–, Mountain Mahogany. U.S.A. 13, 14, 17.
**C. parvifolius* Nutt. Valley–, Mountain Mahogany. U.S.A. 13, 14, 17.
**Parinari robusta* Oliv. Benin Mahogany, Mahogany Nut. Nigeria. 23.
**P. gabunensis* Engl. Mahogany Nut. Nigeria. 23.
P. sp. Red Mahogany, Pauwilli. Nigeria. 23.

XVIII. Combretaceae

Terminalia superba Engl. & Diels. Yellow Mahogany, Shinglewood. W. Africa. 14.

XIX. Myrtaceae

**Eucalyptus botryoides* Sm. Bastard–, Swamp Mahogany. Victoria, N.S.W. 12, 13.
**E. resinifera* Sm. Red–, Forest Mahogany. N.S.W., Queensland. 13, 20.
(**E. hemilampra* F. v. M.). 1.
**E. microcorys* F. v. M. Red Mahogany, Tallow Wood. N.S.W., Queensland. 13, 20.
E. robusta Sm. White–, Swamp Mahogany. N.S.W., Queensland. 13, 20.
**E. acmenioides* Schauer. White Mahogany, Yellow Stringybark. N.S.W., Queensland. 3, 12.
**E. marginata* Sm. Bastard Mahogany, Jarrah. W. Australia. 5, 12.
E. Kirtoniana F. v. M. Red Mahogany, Red Irongum. N.S.W., Queensland. 12.
*(*E. patentinervis* R. T. Baker). 1.

E. umbra R. T. Baker. White Mahogany. N.S.W. 1, 20.
E. diversicolor F. v. M. Mahogany, Karri. W. Australia. 1, 12.
E. longifolia Link & Otto. Mahogany, Woolly Butt. Victoria, N.S.W. 1, 12.
E. pellita F. v. M. Mahogany, Woolly Butt. N.S.W., Queensland. 1, 12.
E. Consideniana Maiden. White Mahogany. N.S.W. 12.
E. gomphocephala DC. Red Mahogany. N.S.W. 12, 14.
E. polyanthemos Schauer. Red Mahogany. N.S.W. 12.
**E. pilularis* Smith var. *Muelleriana* (Hewitt) Maiden. White mahogany. N.S.W. 12.
**E. obliqua* L'Hérit. White Mahogany. N.S.W. 12.
**Tristania laurina* R. Br. Swamp Mahogany. Victoria, Queensland. 13, 24.
**T. conferta* R. Br. Brisbane Mahogany, Brush Box. N.S.W., Queensland. 20, 24.
T. suaveolens (Gaertn.) Sm. Swamp Mahogany. Swamp Box. W. Australia. 3, 20.
Eugenia angophoroides F. v. M. Scrub Mahogany. N. Australia. 20.
Lysicarpus ternifolius F. v. M. Tom Russell's Mahogany. Queensland. 20.

XX. Lecythidaceae

Cariniana pyriformis Miers. Columbian Mahogany. Colombia. 7, 13, 14.
C. estrellensis (Raddi) O. Kze. Brazilian Mahogany. Brazil. (*C. excelsa* Casar). 7.
C. domestica (Mart.) Miers. Brazilian Mahogany. Brazil. 7.
C. legalis (Mart.) O. Kze. Brazilian Mahogany. Brazil. (*C. brasiliensis* Casar). 7.

XXI. Rubiaceae

Adina Galpinii Oliv. Mahogany, African Teak. Portuguese E. Africa. 19.
Sarcocephalus Diderrichii De Wild. Gaboon Mahogany. Trop. Africa, Congo. 24.
S. Trillesii Pierre. Bilinga Mahogany. Congo. 24.
Corynanthe pachyceras K. Schum. Gummy Mahogany. Nigeria. 23. (*C. paniculata* Welw.)
**Mitragyna stipulosa* O. Kuntze. W. African Mahogany. Nigeria. 6, 9. (*M. macrophylla* Hiern).

XXII. Sapotaceae

Manilkara multinervis Dubard. Mahogany, Agonokwi. W. Africa. 6, 13, 24. (*Mimusops multinervis* Baker).
Manilkara lacera Dubard. Mahogany. Nigeria. 23. (*Mimusops lacera* Baker).
**Mimusops globosa* Gaertn. Mahogany, Balata, Bulletwood. C. America. 3, 13.
M. djave Engl. Congo Mahogany, Cherry Mahogany. Congo. 6, 14, 23. (*Baillonella Djave* Pierre). 3.

**M. Heckelii* Hutch. & Dalziel. Abeku Mahogany. Gold Coast, Nigeria. 6.
(*Dumoria Heckelii* A. Chev.).
Mimusops sp. Benin Mahogany. Liberia, Sierra Leone. 23.
**Achras Sapota* L. Mahogany, Nispero. Mexico, C. America. 13.

XXIII. Ebenaceae

Royena sp. Mkuka Mahogany. Tanganyika. 21.

XXIV. Styraceae

Liquidambar styraciflua L. Mahogany, Red Gum. U.S.A. 13.

XXV. Apocynaceae

**Alstonia scholaris* (L.) R. Br. Zitronen Mahagoni (Yellow Mahogany) E. Indies. 14.

XXVI. Boraginaceae

Cordia Goeldiana Huber. S. American Mahogany. Brazil. 7.

XXVII. Bignoniaceae

Tabebuia Donnell-Smithii Rose. White–, Prima Vera Mahogany. Mexico. 13, 15, 24.

XXVIII. Myristicaceae

Myristica sp. Acajou Marron (Chestnut Mahogany). Trinidad. 14.

XXIX. Lauraceae

**Persea indica* Spreng. Madeira Mahogany, Vinacito. Canary Is. 13, 24.
" *Nectandra Wana.*" Surinam Mahogany. W. Indies. 7.
**N. Pisi* Miq. Surinam Mahogany. W. Indies. 7.
Endiandra Palmerstonii C. T. White. Black Mahogany. Queensland. 14.

XXX. Euphorbiaceae

**Ricinodendron africanum* Muell.-Arg. African Mahogany. Trop. Africa. 13, 23, 24.
(*R. Heudelotii* Pierre). Mahogany, Kino, Okwen. Trop. Africa. 13, 23, 24.
**R. Rautanenii* Schinz. Mahogany, Yoruba Coffin Wood. Nigeria. 23. ("*R. Rautenii* ").
Uapaca Heudelotii Baill. Mahogany, Yeye. Nigeria. 23.
U. guineensis Muell.-Arg. False Mahogany. Nigeria. 23.

XXXI. Artocarpaceae

**Artocarpus integra* (Thunb.) Merr. Indian Mahogany, Jackwood. India. 13, 24.

XXXII. Moraceae

**Chlorophora excelsa* Benth. & Hook.f. Swamp Mahogany, Iroko. Trop. Africa. 3.
Treculia africana Decne. Acajou (Mahogany). Ivory Coast. 14.

XXXIII. Juglandaceae

Juglans regia L. var.? Acajou d'Europe (European Mahogany). France. 14.

XXXIV. Betulaceae

Betula lutea Michx. Mountain Mahogany, Grey Birch. U.S.A. 13, 14, 17.

B. lenta L. Mountain Mahogany, Black Birch. U.S.A. 7, 14, 17.

XXXV. Salicaceae

Populus monilifera Ait. Indian Mahogany, Cottonwood. N. America, 25.

(*P. deltoides* Marsh) 19a.

Index of Common Names

Abeku Mahogany. **Mimusops Heckelii* Hutch. & J. M. Dalz. Gold Coast, Nigeria. XXII.

Acajou (Mahogany). **Anacardium occidentale* L. S. America. XV.

Acajou (Mahogany). **Guarea glabra* Vahl. S. America. XIII.

Acajou (Mahogany). *Treculia africana* Decne. Ivory Coast. XXXII.

Acajou Aboudikro (Aboudikro Mahogany). *Entandrophragma tomentosum* A. Chev. Ivory Coast. XIII.

Acajou Bâtard (Bastard Mahogany). **Curatella americana* L. French Guiana. I.

Acajou Blanc (White Mahogany). **Khaya anthotheca* C.DC. (*K. agboensis* A. Chev. *K. euryphylla* Harms). Ivory Coast, Nigeria. XIII.

Acajou Blanc (White Mahogany). *Oncocarpus vitiensis* A. Gray (*Semecarpus atra* Vieill.). New Caledonia. XV.

Acajou Blanc (White Mahogany). **Simaruba amara* Aubl. Guadeloupe. XI.

Acajou d'Afrique (African Mahogany). *Zizyphus vulgaris* Lamk. Tunis. XIV.

Acajou de Cayenne (Cayenne Mahogany). *Cedrela guianensis* A. Juss. French Guiana. XIII.

Acajou de Chine (Chinese Mahogany). **Cedrela sinensis* A. Juss. (*Toona sinensis* Roem.). E. Asia. XIII.

Acajou d'Europe (European Mahogany). *Juglans regia* L. var.? France. XXXIII.

Acajou du Gamboge. *Tarrietia javanica* Blume (*T. cochinchinensis* Pierre). Cochin China. VIII.

Acajou Magona (Magona Mahogany). *Lannea Welwitschii* Engl. Cameroons. XV.

Acajou Marron (Chestnut Mahogany). *Myristica* sp. Trinidad. XXVIII.

Acajou résineux (Resinous Mahogany). *Tarrietia utilis* Sprague. Ivory Coast. VIII.

Acajou Rose de Tonkin (Tonkin Rose Mahogany). **Melia Azedarach* L. Indo-China. XIII.

Acajou Wood (Mahogany Wood). **Cedrela fissilis* Vell. Brazil. XIII.

African Mahogany. **Afzelia africana* Smith. Nigeria. XVI.

African Mahogany. *Carapa procera* DC. (*C. Gogo* A. Chev.), (*C. velutina* C.DC.), (*C. guyanensis* Oliv.), (*C. guineensis* G. Don). W. Africa. XIII.

African Mahogany. *Carapa sp.* (*Xylocarpus* sp.). E. Africa. XIII.

African Mahogany *Entandrophragma caudatum* Sprague (*Pseudocedrela caudata* Sprague). Trop. W. Africa. XIII.
African Mahogany. *Entandrophragma macrophyllum* A. Chev. Trop. W. Africa. XIII.
African Mahogany. **Entandrophragma utile* Sprague (*Pseudocedrela utilis* Dawe & Sprague). Tropical W. Africa. XIII.
African Mahogany. *Khaya caudata* Stapf. Gold Coast. XIII.
African Mahogany. **Khaya ivorensis* A. Chev. (*K. Klainei* Pierre). Ivory Coast to Gaboon. XIII.
African Mahogany. **Khaya senegalensis* A. Juss. (*K. Kerstingii* Engl.). Sudan, Uganda, Cameroons. XIII.
African Mahogany. *Lonchocarpus laxiflorus* Guill. & Perr. Nigeria. XVI.
African Mahogany. **Ricinodendron africanum* Muell.-Arg. Trop. Africa. XXX.
African Mahogany. **Tarrietia utilis* Sprague. Gold Coast, Liberia. VIII.
African Mahogany. **Entrandophragma Candollei* Harms. (*E. ferrugineum* A. Chev.). Tropical W. Africa. XIII.
Annam Mahogany. *Aglaia gigantea* Pellegr. Annam. XIII.
Australian Mahogany. *Cedrela australis* F. v. M. (*Toona australis* (F. v. M.) Harms). Australia. XIII.
Australian Mahogany. *Cedrela serrata* Royle (*Toona serrata* Roem.). India, Ceylon. XIII.
Australian Mahogany. **Cedrela Toona* Roxb. (*Toona ciliata* Roem.). India, Australia. XIII.
Australian Mahogany. **Dysoxylum Fraseranum* Benth. Australia. XIII.
Australian Mahogany. **Synoum glandulosum* A. Juss. Queensland, N.S.W. XIII.
Bastard Mahogany. *Cabralea sp.* Brazil. XIII.
Bastard Mahogany. **Eucalyptus botryoides* Sm. Victoria, N.S.W. XIX.
Bastard Mahogany. **Eucalyptus marginata* Sm. W. Australia. XIX.
Bastard Mahogany. *Ochrocarpus africanus* Oliv. Liberia. IV.
Bataan Mahogany. *Shorea polysperma* (Blanco) Merr. Philippine Is. VI.
Bay Mahogany. **Cercocarpus ledifolius* Nutt. U.S.A. XVII.
Benin Mahogany. *Khaya grandifoliola* C.DC. (*K. grandifolia* Stapf). French Guinea to E. Sudan. XIII.
Benin Mahogany. **Khaya senegalensis* A. Juss. Sudan, Uganda. XIII.
Benin Mahogany. *Mimusops* sp. Liberia, Sierra Leone. XXII.
Benin Mahogany. **Parinari robusta* Oliv. Nigeria. XVII.
Benin Mahogany. *Trichilia Prieuriana* A.Juss. Cape Verde to Congo. XIII.
Big Leaf Mahogany. *Khaya grandifoliola* C.DC. (*K. grandifolia* Stapf). French Guinea to E. Sudan. XIII.
Bilinga Mahogany. *Sarcocephalus Trillesii* Pierre. Congo. XXI.

Black Mahogany. *Endiandra Palmerstonii* C. T. White. Queensland. XXIX.

Blue Mahogany. **Hibiscus elatus* Sw. W. Indies. VII.

Borneo Mahogany. **Calophyllum inophyllum* L. India, Burma. IV.

Bossé Mahogany. *Guarea cedrata* Pellegr. Ivory Coast. XIII.

Bossé Mahogany. *Guarea Thompsonii* Sprague & Hutch. S. Nigeria, Gold Coast. XIII.

Brass Mahogany Bark Tree. **Saccoglottis gabonensis* Urban. (*Aubrya gabonensis* Baill.). Nigeria. X.

Brazilian Mahogany. **Carapa guianensis* Aubl. British Guiana. XIII.

Brazilian Mahogany. **Carapa procera* DC. W. Africa, W. Indies, Guiana. XIII.

Brazilian Mahogany. *Cariniana domestica* (Mart.) Miers. Brazil. XX.

Brazilian Mahogany. *Cariniana estrellensis* (Raddi) O. Kze. (*C. excelsa* Casar). XX.

Brazilian Mahogany. *Cariniana legalis* (Mart.) O. Kze. (*C. brasiliensis* Casar). Brazil. XX.

Brazilian Mahogany. *Plathymenia foliolosa* Benth. (*P. foliosa* Benth.) Brazil. XVI.

Brazilian Mahogany. *Plathymenia reticulata* Benth. Brazil. XVI.

Brisbane Mahogany. **Tristania conferta* R. Br. N.S.W., Queensland. XIX.

British Guiana Mahogany. *Carapa surinamensis* Miq. Surinam. XIII.

Brown Mahogany. **Entandrophragma septentrionale* A. Chev. Gold Coast. XIII.

Brown Mahogany. **Lovoa Klaineana* Pierre. Gold Coast, Nigeria. XIII.

Brown Mahogany. **Lovoa Swynnertonii* E. G. Baker. C. Africa. XIII.

Burma Mahogany. **Pentace burmanica* Kurz. Burma. IX.

Burma Mahogany. *Pentace Griffithii* King. Burma. IX.

Cameroon Mahogany. *Entandrophragma Rederi* Harms. Cameroons. XIII.

Caoba Falsa (False Mahogany). *Bauhinia candicans* Benth. Argentine XVI.

Cape Mahogany. **Ptaeroxylon obliquum* (Thunb.) Radlk. S. Africa. XIII.

Cape Mahogany. **Trichilia emetica* Vahl. Uganda, Rhodesia. XIII.

Cedar Mahogany. **Entandrophragma cylindricum* Sprague (*E. rufum* Chev.), (*Pseudocedrela cylindrica* Sprague). Tropical W. Africa. XIII.

Cedar Mahogany. **Entandrophragma utile* Sprague (*Pseudocedrela utilis* Dawe & Sprague). Tropical W. Africa. XIII.

Cedar Mahogany. *Guarea Thompsonii* Sprague & Hutch. S. Nigeria, Gold Coast. XIII.

Ceylon Mahogany. *Melia dubia* Cav. Ceylon. XIII.

Cherry Mahogany. *Mimusops djave* Engl. (*Baillonella Djave* Pierre). Congo. XXII.

Chijole Mahogany. **Calophyllum antillanum* Britton (*C. Calaba* Jacq.) Tropical America. IV.
Coffee Tree Mahogany. **Gymnocladus dioica* Koch. N. America. XVI.
Cola Mahogany. *Cola cauliflora* Mast. Nigeria. VIII.
Columbian Mahogany. *Cariniana pyriformis* Miers. Columbia.
Congo Mahogany. *Mimusops djave* Engl. (*Baillonella Djave* Pierre). Congo. XXII.
Cuba Mahogany. **Lysiloma Sabicu* Benth. W. Indies. XVI.
Cuba Mahogany. *Pithecellobium arboreum* (L.) Urb. W. Indies. XVI.
Demerara Mahogany. **Carapa guianensis* Aubl. British Guiana. XIII.
Derham Mahogany. *Wallacedendron celebicum* Koord. Philippine Is. XVI.
Detarr Mahogany. **Detarium senegalense* Gmelin. Tropical W. W. Africa. XVI.
Duika Mahogany (possibly). **Irvingia gabonensis* Baill. (*I. Barteri* Hook.f.). Cameroons. XI.
Edjun Mahogany. *Canarium Mansfeldianum* Engl. Nigeria. XII.
E. Indian Mahogany. **Chukrasia tabularis* A. Juss. India, Burma. XIII.
E. Indian Mahogany. **Pterocarpus dalbergioides* Roxb. E. Indies. XVI.
E. Indian Mahogany. *Shorea Curtisii* Dyer. Malay, Borneo. VI.
E. Indian Mahogany. **Shorea robusta* Gaertn.f. India. VI.
E. Indian Mahogany. **Soymida febrifuga* A. Juss. Ceylon. XIII.
False Mahogany. *Capaca guineensis* Muell. Nigeria. XXX.
False Hill Mahogany. *Cistanthera papaverifera* A. Chev. Nigeria. IX.
Fiji Mahogany. **Calophyllum Calaba* L. (*C. Burmanni* Wight). Fiji, Ceylon. IV.
Fiji Mahogany. **Calophyllum spectabile* Willd. Fiji, Burma. IV.
Forest Mahogany. **Eucalyptus resinifera* Sm. (*E. hemilampra* F.v.M.). N.S.W., Queensland. XIX.
Gaboon Mahogany. **Aucoumea Klaineana* Pierre. Gaboon. XII.
Gaboon Mahogany. *Canarium Schweinfurthii* Engl. Nigeria, C. Africa. XII.
Gaboon Mahogany. *Entandrophragma Pierrei* A. Chev. Gaboon. XIII.
Gaboon Mahogany. **Khaya anthotheca* C.DC. (*K. agboensis* A. Chev.), (*K. euryphylla* Harms). Nigeria, Ivory Coast. XIII.
Gaboon Mahogany. *Sarcocephalus Diderrichii* De Wild. Tropical Africa. XXI.
Gogo Mahogany. *Carapa procera* DC. (*C. Gogo* A. Chev.), (*C. velutina* C.DC.). W. Africa. XIII.
Grand Bassam Mahogany. **Khaya ivorensis* A. Chev. Ivory Coast to Gaboon. XIII.
Gummy Mahogany. *Corynanthe pachyceras* K. Schum. Nigeria. XXI.
Hard Cedar Mahogany. *Pseudocedrela Kotschyi* Harms. French Sudan, Nigeria. XIII.
Hard Mahogany. "*Detarium guineense.*" Cameroons. XVI.

Honduras Mahogany. **Swietenia macrophylla* King. C. America. XIII.
Horseflesh Mahogany. *Caesalpinia sp.* W. Indies. XVI.
Horseflesh Mahogany. *Peltophorum adnatum* Griseb. W. Indies. XVI.
Horseflesh Mahogany. **Swartzia tomentosa* DC. S. America. XVI.
Indian Mahogany. **Artocarpus integra* (Thunb.) Merr. (*A. integrifolia* L.). India. XXXI.
Indian Mahogany. **Cedrela odorata* L. Cuba. XIII.
Indian Mahogany. *Melia composita* Willd. India. XIII.
Indian Mahogany. **Pterocarpus indicus* Willd. India, Malay. XVI.
Indian Mahogany. *Populus monilifera* Ait. N. America XXXV.
Indian White Mahogany. *Canarium euphyllum* Kurz. Andaman Is. XII.
Iron Mahogany. *Erythrophleum sp.* Australia. XVI.
Juana Costa Mahogany. *Enterolobium cyclocarpum* Griseb. Tropical America. XVI.
Konta Mahogany. *Afzelia bracteata* T. Vogel. Liberia. XVI.
Lagos Mahogany. *Khaya ivorensis* A. Chev. W. Africa. XIII.
Lagos Mahogany. *Trichilia Prieuriana* A. Juss. Cape Verde to Congo. XIII.
Libreville Mahogany. **Aucoumea Klaineana* Pierre (*Boswellia Klaineana*). Gaboon. XII.
Madagascar Mahogany. *Khaya madagascariensis* Jum. & Perrier. Madagascar. XIII.
Madeira Mahogany. **Persea indica* Spreng. Canary Is. XXIX.
Madeira Mahogany. **Tamarindus indica* L. W. Indies, Florida. XVI.
Mahogany. *Acacia Koa* A. Gray. Philippine Is. XVI.
Mahogany. **Achras Sapota* L. Mexico, C. America. XXII.
Mahogany. *Adina Galpinii* Oliv. Portuguese E. Africa. XXI.
Mahogany. *Brachystegia eurycoma* Harms. Nigeria. XVI.
Mahogany. **Calophyllum brasiliense* Camb. Brazil. IV.
Mahogany. *Caraipa grandiflora* Mart. Brazil. V.
Mahogany. *Daniellia caudata* Craib. Nigeria. XVI.
Mahogany. *Dialium Staudtii* Harms. Nigeria. XVI.
Mahogany. *Didelotia africana* Baill. S. Nigeria. XVI.
Mahogany. *Eucalyptus diversicolor* F. v. M. W. Australia. XIX.
Mahogany. *Eucalyptus longifolia* Link and Otto. Victoria, N.S.W. XIX.
Mahogany. *Eucalyptus pellita* F.v.M. Queensland, N.S.W. XIX.
Mahogany. *Garcinia sp.* Liberia. IV.
Mahogany. **Gymnocladus dioica* Koch. N. America. XVI.
Mahogany. **Hymenaea Courbaril* L. S. America. XVI.
Mahogany. *Liquidambar styraciflua* L. U.S.A. XXIV.
Mahogany. *Manilkara lacera* Dubard. (*Mimusops lacera* Baker). Nigeria. XXII.
Mahogany. *Manilkara multinervis* Dubard. (*Mimusops multinervis* Baker). W. Africa. XXII.
Mahogany. *Melanorrhoea laccifera* Pierre. Indo-China. XV.
Mahogany. *Mimusops globosa* Gaertn. C. America. XXII.

Mahogany. *Poeppigia excelsa* A. Rich. San Domingo. XVI.
Mahogany. **Protium altissimum* March. Guiana. XII.
Mahogany. *Rhus integrifolia* (Nutt.) Benth. & Hook. f. California. XV.
Mahogany. *Ricinodendron Africanum* Muell.-Arg. Trop. Africa. XXX.
Mahogany. **Ricinodendron Rautanenii* Schinz. (*"R. Rautenii"*). Nigeria. XXX.
Mahogany. **Saccoglottis gabonensis* Urban. (*Aubrya gabonensis* Baill.) Liberia, Nigeria. X.
Mahogany. *Uapaca Heudelotii* Baill. Nigeria. XXX.
Mahogany Nut. **Parinari gabunensis* Engl. Nigeria. XVII.
Mahogany Nut. **Parinari robusta* Oliv. Nigeria. XVII.
Mbolo Mahogany. *Entandrophragma Bussei* Harms. W. Africa. XIII.
Mexican Mahogany. **Swietenia humilis* Zucc. Mexico. XIII.
Miva Mahogany. *Dysoxylum cerebriforme* F. M. Bailey. Queensland. XIII.
Miva Mahogany. **Dysoxylum Muelleri* Benth. Queensland. XIII.
Mkuka Mahogany. *Royena sp.* Tanganyika. XXIII.
Mountain Mahogany. *Betula lenta* L. U.S.A. XXXIV.
Mountain Mahogany. **Betula lutea* Michx. U.S.A. XXXIV.
Mountain Mahogany. **Cercocarpus ledifolius* Nutt. U.S.A. XVII.
Mountain Mahogany. **Cercocarpus parvifolius* Nutt. U.S.A. XVII.
Mountain Mahogany. *Lonchocarpus sp.* (probably *Peltophorum sp.*). Sierra Leone. XVI.
Natal Mahogany. **Kiggelaria africana* L. (*K. Dregeana* Turcz.). Natal. II.
Natal Mahogany. **Trichilia emetica* Vahl. Uganda, Rhodesia. XIII.
New Zealand Mahogany. *Dysoxylum spectabile* Hook.f. New Zealand. XIII.
Panama Mahogany. *Anacardium Rhinocarpus* DC. C. and S. America. XV.
Philippine Mahogany. *Dipterocarpus sp.* Philippine Is., Malay. VI.
Philippine Mahogany. **Pterocarpus indicus* Willd. India, Malay. XVI.
Philippine Mahogany. *Shorea negrosensis* Foxw. Philippine Is. VI.
Philippine Mahogany. *Tarrietia javanica* Blume. Philippine Is. VIII.
Philippine Mahogany. *Tarrietia sylvatica* (Vid.) Merr. Philippine Is. Cochin China. VIII.
Pink Mahogany. *Gossweilerodendron balsamiferum* Harms. Nigeria, Congo. XVI.
Pink Mahogany. *Guarea cedrata* Pellegr. Ivory Coast. XIII.
Prima Vera Mahogany. *Tabebuia Donnell-Smithii* Rose. Mexico. XXVII.
Quibaba da Queta Mahogany. *Entandrophragma angolense* (Welw.) C.DC. (*Swietenia angolense* Welw.). Angola. XIII.
Red Mahogany. *Eucalyptus gomphocephala* DC. N.S.W. XIX.
Red Mahogany. *Eucalyptus Kirtoniana* F.v.M. (*E. paeniinervis* R. T. Baker). N.S.W., Queensland. XIX.
Red Mahogany. **Eucalyptus microcorys* F.v.M. N.S.W., Queensland. XIX.

Red Mahogany. *Eucalyptus polyanthemos* Schauer. N.S.W. XIX.
Red Mahogany. **Eucalyptus resinifera* Sm. (*E. hemilampra* F.v.M.). N.S.W., Queensland. XIX.
Red Mahogany. **Khaya ivorensis* A. Chev. Ivory Coast to Gaboon. XIII.
Red Mahogany. *Parinari sp.* Nigeria. XVII.
Rhodesian Mahogany. **Afzelia quanzensis* Welw. Rhodesia. XVI.
Rhodesian Mahogany. **Copaifera coleosperma* Benth. S. Rhodesia. XVI.
Rhodesian Mahogany. **Khaya nyasica* Stapf. Rhodesia, C. Africa. XIII.
Rose Mahogany. **Dysoxylum Fraseranum* Benth. (*D. Lessertianum* Benth.). Australia. XIII.
Rose Mahogany. *Dysoxylum Pettigrewianum* F. M. Bailey. Queensland. XIII.
Santa Maria Mahogany. *Calophyllum antillanum* Britton (**C. Calaba* Jacq.). Trop. America. IV.
Sapeli Mahogany. *Entandrophragma utile* Sprague. W. Africa. XIII.
Satin Mahogany. **Calophyllum australianum* F.v.M. Queensland. IV.
Satin Mahogany. *Calophyllum costatum.* F. M. Bailey. Queensland.
Satin Mahogany. **Calophyllum tomentosum* Wight. India, Ceylon. IV.
Satin Mahogany. *Calophyllum Touriga* C. T. White & Francis. Queensland. IV.
Satin Mahogany. *Guarea africana* Welw. Liberia. XIII.
Scented Mahogany. *Guarea glomerulata* Harms. Cameroons, Nigeria. XIII.
Scented Mahogany. *Guarea Thompsonii* Sprague & Hutch. S. Nigeria, Gold Coast. XIII.
Scented Mahogany. *Entandrophragma Candollei* Harms. W. Africa. XIII.
Scrub Mahogany. *Eugenia angophoroides* F. v. M. N. Australia. XIX.
Scrub Mahogany. **Synoum glandulosum* A. Juss. Queensland, N.S.W. XIII.
S. American Mahogany. *Cordia Goeldiana* Huber. Brazil. XXVI.
Spanish Mahogany. **Swietenia Mahagoni* Jacq. W. Indies. XIII.
Spur Mahogany. *Dysoxylum Pettigrewianum* F. M. Bailey. Queensland XIII.
Straits Mahogany. *Melanorrhoea Maingayi* Hook.f. Malaya, Sunda. XV.
Surinam Mahogany. *Nectandra Pisi* Miq. W. Indies. XXIX.
Surinam Mahogany. "*Nectandra Wana*". W. Indies. XXIX.
Swamp Mahogany. **Chlorophora excelsa* Benth. & Hook.f. Trop. Africa. XXXII.
Swamp Mahogany. **Eucalyptus botryoides* Sm. Victoria, N.S.W. XIX.
Swamp Mahogany. **Eucalyptus robusta* Sm. N.S.W., Queensland. XIX.
Swamp Mahogany. **Tristania laurina* R. Br. Victoria, Queensland. XIX.

Swamp Mahogany. *Tristania suaveolens* (Gaertn.) Sm. W. Australia. XIX.

Tenasserim Mahogany. **Pterocarpus dalbergioides* Roxb. E. Indies. XVI.

Tenasserim Mahogany. **Pterocarpus macrocarpus* Kurz. Burma. XVI.

Togo Mahogany. **Khaya senegalensis* A.Juss. Trop. Africa. XIII.

Tom Russell's Mahogany. *Lysicarpus ternifolius* F. v. M. Queensland. XIX.

Valley Mahogany. **Cercocarpus parvifolius* Nutt. U.S.A. XVII.

Venezuelan Mahogany. *Swietenia Candollei* Pittier. Venezuela. XIII.

W. African Mahogany. *Entandrophragma excelsum* Sprague (*Pseudocedrela excelsa* Dawe & Sprague). Tropical W. Africa. XIII.

W. African Mahogany. **Mitragyna stipulosa* O. Kze. (*M. macrophylla* Hiern). Nigeria. XXI.

White Mahogany. *Antrocaryon Klaineanum* Pierre. Cameroons. XV.

White Mahogany. *Entandrophragma macrophyllum* A. Chev. Tropical W. Africa. XIII.

White Mahogany. **Eucalyptus acmenioides* Schauer. N.S.W., Queensland. XIX.

White Mahogany. *Eucalyptus Consideniana* Maiden. N.S.W. XIX.

White Mahogany. **Eucalyptus obliqua* L'Hérit. N.S.W. XIX.

White Mahogany. **Eucalyptus pilularis* Smith var. *Muelleriana* (Hewitt) Maiden. N.S.W. XIX.

White Mahogany. *Eucalyptus robusta* Sm. N.S.W., Queensland. XIX.

White Mahogany. *Eucalyptus umbra* R. T. Baker. N.S.W. XIX.

White Mahogany. *Khaya anthotheca* C.DC. Nigeria. XIII.

White Mahogany. **Piptadenia africana* Hook. f. Tropical W. Africa. XVI.

White Mahogany. *Santiriopsis Klaineana* Pierre. Nigeria. XII.

White Mahogany. *Tabebuia Donnell-Smithii* Rose. Mexico. XXVII.

White Mahogany. *Vochysia hondurensis* Sprague. British Honduras. III.

Wild Mahogany. *Mosquitoxylum jamaicense* Krug. & Urb. British Honduras. XV.

Yellow Mahogany. *Plathymenia foliolosa* Benth. (*P. foliosa* Benth.). Brazil. XVI.

Yellow Mahogany. *Plathymenia reticulata* Benth. Brazil. XVI.

Yellow Mahogany. *Terminalia superba* Engl. & Diels. W. Africa. XVIII.

Zitronen Mahagoni (Yellow Mahogany). **Alstonia scholaris* (L.) R. Br. E. Indies. XXV.

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XXI—CONTRIBUTIONS TO THE FLORA OF TROPICAL AMERICA: XXVI.* N. Y. Sandwith.

THE GENUS TOVOMITA IN BRITISH GUIANA.

The Tovomitas of British Guiana are noteworthy for their habit and their common occurrence in the coastal rain-forests; no species has yet been discovered which is confined to the sandstone districts or mountains of the interior. They are small laticiferous trees with stilt roots of varying height, and are found in several kinds of habitat and forest-type; thus they are seen about equally on clay or on sand, in swampy gullies, on slopes or on hill-tops, from mora forest up to wallaba (see Davis and Richards, Journal of Eco-

*Continued from K.B. 1936, 16.

logy, **22,** 129). The Arawaks know them by the name Awasakuli, and distinguish only "small-leaved" and "large-leaved" (or broad-leaved) kinds. The existing herbarium material, however, has yielded evidence for the occurrence in the Colony of at least nine, and possibly of ten, species. This may be compared with the known representation of the genus in Surinam (6 species) and in Trinidad (a single species), but not with its high development in Amazonian Brazil, Peru and Venezuela. In the present account, three new species are proposed, two of them based on material of single collections; two, *T. macrophylla* Walp. and *T. Choisyana* Pl. et Tr., are recorded for the first time from British Guiana, but further material of both is needed for confirmation of the identification; while two are reduced, *T. Jenmani* Engl. to *T. brevistaminea* Engl., and *T. nigrescens* Pl. et Tr. to *T. umbellata* Benth. which, it is shown, may or may not be a native of the Colony.

The key, which is based on existing herbarium specimens, must be regarded as purely temporary owing to the difficulty in assembling complete material of species of this genus. This is due to the common dioecism, which is responsible for a widely different appearance in the male and female inflorescence of a given species and, in some at least, for a larger flower with longer (and sometimes thinner) filaments in the female. It is unfortunate that only the male inflorescence, and no fruit, is present in the material of three species (*obscura, umbellata, calodictyos*), that it is absent in another (*Choisyana*) which is provisionally recorded, and that the record of one (*macrophylla*) is based on the evidence of branchlets, leaves and fruit.

It might be suggested that the keys for distinguishing species of tropical forest trees should consist entirely of characters taken from the branchlets and leaves. This might indeed be possible for many genera, after an extremely intimate study of venation, but such keys would almost always require elaborate illustration, and anatomical characters are useless for field and herbarium work. A student of the leaves of *Tovomita* might well shrink from attempting such a task. The extraordinary variation in the dimensions and shape of the leaves of each species becomes a minor matter when one is further confronted with variability in the prominence and direction of the principal nerves. The venation would not, perhaps, have been such a source of difficulty if this very prominence and direction had not been employed by Vesque for the division of the genus into his two sections, *Clusiaefoliae* and *Chrysochlamydifoliae*. The extremes of these supposed sections look, indeed, very widely different; of the species dealt with below, *obscura, cephalostigma* and *umbellata* (at any rate, by the upper surface) fall happily and unmistakably into the first, while *calodictyos, macrophylla, Choisyana* and *obovata* can safely be assigned to the second. But what shall we say of the other three, *grata, brevistaminea* (*Clusiaefoliae*) and *Schomburgkii* (*Chrysochlamydifoliae*), the first two of which are not convincing members of either section, while in the two latter a

straight and a strongly arcuate principal lateral nerve may often be seen adjacent on the same leaf? The fact is that the venation cannot be used as a sectional character owing to its intermediate nature in certain species. The arching or straightness of the principal laterals is often far too much a matter of degree, varying on the same leaf or from leaf to leaf; the distinction by their greater prominence of these nerves from the intermediate laterals or " lesser primaries " also varies from leaf to leaf, or from surface to surface, in several species; while the behaviour of these intermediate laterals themselves is most perplexing, since they may either simulate the length and direction of the principal nerves (character of *Clusiaefoliae*) or may run obliquely, often for only a short distance, or curve round quickly almost at a right angle (characters found in *Chrysochlamydifoliae*). In the key given below the outstanding prominence of the main lateral nerves is adopted as a primary division, since it is an obvious and helpful character, but direction and arching are hardly ever employed, and the distance of nerves from each other is only used when it is made quite clear which ranks are involved; in this way a kind of compromise has been reached between the two supposed sections, but only by placing *T. grata* and *T. brevistaminea* in both halves of the key.

KEY TO THE BRITISH GUIANA SPECIES OF TOVOMITA.

Main primary lateral nerves of the leaves not distinctly stronger than the others, the leaf surface therefore occupied by numerous close parallel lateral nerves less than 5 mm. apart:

Filaments of ♂ flowers (also of ♀ where known) more than 50, the outermost not very conspicuously shorter than the others, all thin and linear:

Leaves small, normally less than 10 cm. long, shortly obtusely acuminate or cuspidate; petiole usually less than 1·5 cm. long; perianth segments commonly 9, petals not decussate with sepals .....4. *grata*

Leaves of medium size, normally more than 10 cm. long, acutely long-acuminate; petiole usually more than 1·5 cm. long; perianth segments 6, petals decussate with sepals .....1. *obscura*

Filaments of ♂ flowers (also of ♀ where known) less than 50, either the outermost extremely short, or all of them short, fat and clubshaped:

Filaments fat, flattish, clubshaped, only up to 3 mm. long in ♂ flowers; ♂ inflorescences about 3 cm. long: .....
5. *brevistaminea*

Filaments thin, linear:

Leaves elliptic, not at all or very shortly cuspidate-acuminate; ♂ inflorescences short, condensed, 3·5 cm. long or less.....
2. *umbellata*

Leaves usually distinctly broader above the middle and more or less obovate or obovate-elliptic, conspicuously

cuspidate-acuminate ; ♂ inflorescences large, lax, with long widely-spreading branches far exceeding 3 cm. in length .....3. *cephalostigma*

Main primary lateral nerves distinctly stronger than the others, more (often much more) than 5 mm. apart :

Leaves copiously and regularly dotted beneath, coriaceous ; main lateral nerves numerous, normally more than 10, curving up to the margin ; expanded flowers 2 cm. or more in diam. .....7. *macrophylla*

Leaves not copiously dotted beneath :

Leaves papery or thinly coriaceous ; flowers rather small, 1·5 cm. or less in diam.; petals decussate with sepals ; filaments 5 mm. long or shorter ; no remains of flower at base of ripe fruit (fruit unknown in *calodictyos*) :

Main lateral nerves 16 or more, conspicuously anastomosing at some distance from the margin ; inflorescence much branched, up to 12·5 cm. long.....8. *calodictyos*

Main lateral nerves about 10 or fewer, nearly straight or conspicuously curving up to the margin ; inflorescence short, little branched, up to about 3 cm. long :

Leaves drying reddish-brown beneath ; filaments fat and club-shaped, less than 25, very short in the ♂ flower (about 2–3 mm. long) .....5. *brevistaminea*

Leaves drying green beneath ; filaments slender and linear, more than 25, not conspicuously short in the ♂ flower 6. *Schomburgkii*

Leaves stiffly papery to thickly coriaceous ; flowers large for the genus, 1·5–3 cm. diam.; petals not decussate with sepals ; filaments numerous, the longest exceeding 5 mm.; remains of flower persistent at base of ripe fruit :

Leaves small, up to 12 cm. long, main lateral nerves normally less than 1 cm. apart, often scarcely distinguishable from intermediate laterals ; flowers not very large, petals not exceeding 10 mm., and longest filaments not exceeding 8 mm. in length.....4. *grata*

Leaves larger, normally more than 12 cm. long, main lateral nerves normally much more than 1 cm. apart, sharply distinguished ; flowers large, petals usually exceeding 10 mm., and longest filaments usually exceeding 8 mm. in length :

Leaves stiffly papery to coriaceous, lanceolate, oblong or elliptic, attenuate to an acute, obtuse or slightly acuminate apex .....9. *Choisyana*

Leaves thickly coriaceous, the minor venation often completely impressed, obovate or obovate-oblong, rounded or emarginate at apex, rarely very shortly acutely cuspidate .....10. *obovata*

1. **Tovomita** (§ "*Clusiifoliae*") **obscura** *Sandwith* sp. nov.; *T. cephalostigmati* Vesque atque *T. umbellatae* Bth. affinis, ab ambabus staminibus floris masculi multo numerosioribus haud valde conspicue inaequalibus, praeterea ab illa inflorescentia mascula brevi multo minus evoluta, ab hac foliis longe acutissime acuminatis, alabastris florum masculorum majoribus differt.

Arbor parva, ramulis summis teretibus satis gracilibus. *Folia* elliptica vel obovato-elliptica, apice conspicue longe (nonnunquam ad 2 cm.) acutissime acuminata, rarius cuspidata, basi acute cuneata et in petiolum attenuata, 10–21·5 cm. longa, 3·7–8·3 cm. lata, firme chartacea, siccitate utrinque brunnescentia, costa supra paullum elevata vel subplana subtus prominente, nervis primariis lateralibus numerosis late adscendentibus subrectis secus marginem ipsum in nervum marginalem mergentibus utrinque prominulis, praeterea aliis e costa exorientibus interjectis, reticulatione utrinque saepius obvia, pagina inferiore exacte ut in *T. cephalostigmate* minute crebre rugulosa ; petiolus 1·8–3 cm. longus. *Inflorescentia mascula* tantum visa, apice ramulorum terminalis, brevis, ad 3 cm. tantum longa, e basi quaternatim usque senatim ramosa ; bracteae inferiores triangulares acutae, superiores lanceolatae ; pedicelli 3·5–5 mm. longi, sed floris terminalis usque 9 mm. longi. *Alabastra* matura ovoidea, plus minusve apiculata, 6–8 mm. longa, 4·5–6 mm. diametro. *Sepala* 2, alabastrum involventia, coriacea, 7·5–8 mm. longa. *Petala* 4, sepalis decussata, 2 exteriora (vel sepala interiora !) late ovato-oblonga, 7 mm. longa, 5 mm. lata, 2 interiora anguste oblonga, 7 mm. longa, 2·75 mm. lata. *Stamina* circiter 70, filamentis aliquantum inaequalibus, exterioribus 3 mm. longis, ceteris ad 5·5 mm. longis, omnibus linearibus gracilibus ; antherae brevissimae, 0·3 mm. longae, filamentis haud latiores. *Fructus* ignotus.

British Guiana. Bartica-Potaro Road, 88 miles from Bartica, c. 400 ft., June 27th, 1933, *Tutin* 300 (Brit. Mus.; Kew) : tree 40 ft. high, 6 in. diam., in morabukea bush on red clayey soil ; bark grey ; flowers yellow-green.

Although only the male inflorescence is present, this combines with the long petioles and the characters of the leaf-blade to present a very distinct entity which cannot be referred to any known species.

2. **T. umbellata** *Benth.* in Hook. Lond. Journ. Bot. **2,** 367 (1843) ; Walp. Rep. **2,** 810 (1843) ; Planchon et Triana in Ann. Sci. Nat. sér. 4, **14,** 280 (1860) ; Engler in Mart. Fl. Bras., **12,** pars 1, 448 (1888), et in Pflanzenfam., 2 Aufl., **21,** 207 (1925) ; Vesque, Epharmosis, **3,** tt. 93, 94 (1892) et in DC. Mon. Phan., Guttiferae, 204 (1893).—*T. nigrescens* Pl. et Tr., l.c., 276 ; Engl., l.c., 450 et 207 ; Vesque, l.c., 208.

Without locality, 1838–1839, *Robert Schomburgk* 991 (type in Herb. Benth., Kew ! Herb. Hook., Kew ! Brit. Mus.! Herb. Boissier, Geneva, copied in error as 901, type of *T. nigrescens* !)

Robert Schomburgk's manuscript field-notes, preserved at

Kew, are as follows: "991. A tree 40 feet high, brown bark, spreading branches. Leaves lucid dark green, below lighter. Calix pea-green. Petals and fructification greenish-yellow, highly odoriferous." This information has been used in Bentham's description, but he has added "British Guiana" as the locality. For this there was no warrant. A study of Robert Schomburgk's letters to Bentham, read in conjunction with his published "Travels" and his manuscript field-notes, shows that no. 991 of Bentham's (the top) set was packed for despatch to England in the last consignment of this set (apparently of two boxes, one of them marked "G.B. 13") which contained material of all the specimens gathered by him between his departure from Fort Sao Joaquin, on the Rio Branco, on September 20th, 1838, and his final arrival in Georgetown on June 20th, 1839. No evidence has been discovered to show that Robert Schomburgk gave numbers to his gatherings in the sequence in which they were collected; the evidence of the manuscript notes and letters points rather to the probability of his having numbered them up at convenient stages of the journey when he had time to rest and prepare the despatch of his boxes of specimens. When no definite locality is given, it is quite likely that it had been forgotten. All we can reasonably say of any given number, therefore, when no locality is specified, is that it was collected between certain dates and between certain definite points of the itinerary. In the present instance, no. 991 may have been collected in British Guiana, in Venezuela, or in Brazil, since in the period mentioned above Schomburgk undertook his extremely hazardous journey *viâ* Pirara and Roraima (British Guiana) along the Parima and Padamo Rivers to Esmeralda and the Orinoco (Venezuela), then down the Cassiquiare to the Brazilian Rio Negro, where he collected many specimens which have been wrongly cited from British Guiana, and so back by the Rio Branco to the Rupununi District and Georgetown. Unfortunately, no other collections have yet been seen which can be referred with confidence to *T. umbellata*, so that the species must at present be included with some doubt in the flora of the Colony.

We now come to the question of the identity of *T. nigrescens* Pl. & Tr., which has hitherto been regarded as an independent species and which appeared to be unrepresented by authentic material at Kew. This seemed remarkable since the species was based by its authors on the specimen in the Boissier Herbarium at Geneva of no. 901 of Robert Schomburgk's same collection, of which the first and most complete set is at Kew. Not only did the description read sufficiently like that of *T. umbellata*, but no. 901 of the manuscript field-notes was described by Schomburgk as a herb with a cream-coloured catkin. Moreover, it was a significant and curious fact that none of the monographers who have dealt with these two species had examined the type material of both. Thus Planchon and Triana had not seen that of *T. umbellata*, Engler that of *T. nigrescens*, and Vesque that of *T. umbellata*; Vesque's

descriptions and figures of the latter (see Epharmosis, **3**, tt. 93, 94) are taken from specimens collected by Mélinon in French Guiana. Even more recently, Dr. Eyma, in his critical notes on Surinam Tovomitas, mentions *T. nigrescens* alone, and cites specimens of this from Paris and the British Museum, but a search in the latter herbarium has revealed only the type collection of *T. umbellata.* The solution of all this seemed to lie in a copyist's error in writing the figures of the collector's number for certain sets, *e.g.* those now at Geneva and Paris, and this has now been proved by the comparison of the type of *T. umbellata* with that of *T. nigrescens* which has been kindly lent by the authorities of the Herbier Boissier. The material of the two agrees perfectly and is quite obviously from the same gathering, which is proved by the field-notes to be no. 991. After this it is amusing to look back on the desperate efforts of Engler and Vesque to key off the two species by such unworkable characters as the texture of the leaves and the relation in breadth of the anther to the filament, though in fairness to Vesque it must be admitted that he was relying mainly on Mélinon's material for his conception of *T. umbellata.* Again, the interpretation of *T. nigrescens* had been made unnecessarily difficult for later workers by the authors of that species, who laid misleading stress on the colour of the buds which they described as " pube tenuissima adpressissima sericea aureocuprea subnitentia vel glabrata." This colour, which is to be seen also on the pedicels, does not in fact appear to be due to any pubescence, however minute, the presence of which would be most unexpected in any species of this genus.

3. **T. cephalostigma** *Vesque*, l.c. t. 96, et l.c. 207 ; Engl., l.c. 207 ; Sandwith in Kew Bull. 1931, 176 ; Eyma, Polygonaceae, Guttiferae and Lecythidaceae of Surinam, 44 (1932) et in Fl. Surinam, **3**, 104 (1934).—*T. guianensis* Engl., l.c. 446, partim, non Aubl.

For localities and notes, see Kew Bull. 1931, 176. Probably frequent on sandy soils and in wallaba forest. Usually a small tree. The leaves normally dry a brown or pinkish-brown colour on the lower surface.

Distr. Surinam, French Guiana.

4. **Tovomita grata** *Sandwith* sp. nov.; inter congeneros ob folia parva, flores fructusque pro rata magnos, sepala 4, petala 5 sepalis haud decussata, stamina valde numerosa filamentis longis tenuibus, stylis liberis longis distinguenda; a *T. Eggersii* Vesque, *T. umbellata* Benth. et *T. Riedeliana* Engl. floribus majoribus, staminibus numerosioribus longioribus, petalis 5 statim recedit ; a *T. longicuneata* Engl., quae petalis 5 gaudet, forma foliorum longitudine filamentorum omnino abhorret ; forsan ad *T. Choisyanam* Pl. et Tr. atque *T. obovatam* Engl. (§ *Chrysochlamydifoliae*) melius approximans, sed magnitudine atque nervatione foliorum primo visu differt.

Arbor parva, sed altitudine nonnunquam mediocri, ramulis summis subteretibus vel apicem versus compressis junioribus

laevibus levissime striatulis. *Folia* obovato-elliptica, elliptica vel oblanceolata, apice vulgo breviter vel brevissime satis late obtuse cuspidato-acuminata vel cuspidata vel acuminata, rarius obtusa tantum, basi acute cuneata, pro genere parva, 5–12 cm. longa, 2–5·5 cm. lata, rigide chartacea vel coriacea, siccitate vulgo brunnea vel nigrescentia, rarius olivacea, costa utrinque praesertim subtus elevata, nervis primariis lateralibus angulo lato necnon variabili patulis subrectis secus marginem ipsum in nervum marginalem mergentibus, ab aliis secundariis parallelis interjectis supra saltem saepius etiam infra vix distinguendis, omnibus cum reticulatione tertiaria supra vel impressis vel obviis subtus ut in *T. Eggersii* manifestis prominulis; petiolus 1–1·8 cm. longus. *Inflorescentiae masculae* e basi ipsa vel apice pedunculi brevis ternatim ramosae, ad 3·5 cm. tantum longae, ad 6 cm. latae; rami primarii 5–9 mm. longi; pedicelli 0·7–1·3 cm. longi; bracteolae basi connatim deciduae, ovatae, 1 mm. longae. *Alabastra* matura ovoideo-oblonga vel oblonga, siccitate brunnea, apice rotundata, haud vel raro subapiculata, 7–8 mm. longa, 4–5·5 mm. diametro. *Sepala* 4; duo exteriora coriacea, basi connata, lata ovata, 7–8 mm. longa, 6–8·5 mm. lata; duo interiora petaloidea, tenuiora, submembranacea, oblonga vel obovato-oblonga, 9–10 mm. longa, 4·25–4·75 mm. lata. *Petala* 5, alba, sepalis haud decussata, firma, oblonga, facie angusta, 7–10 mm. longa, 1·25–4 mm. lata, interiora exterioribus breviora ac angustiora. *Stamina* numerosa, circiter 70–90, haud valde inaequalia sed exteriora aliquantum breviora; filamenta linearia, tenuia, adulta evoluta 4·5–8 mm. longa; antherae circiter 0·5 mm. longae, filamentis paulum latiores. *Inflorescentia feminea* vulgo triflora, alabastris ovoideis maturis fere ad 1 cm. longis et 6 mm. latis. *Flores* masculis similes, petalis 5, staminodiis staminibus similibus. *Ovarium* longitudinaliter 10-costatum; styli 5, liberi, conspicui, ad 5 mm. longi, ovario plus minusve aequilongi, divergentes, flexuosi vel sigmoidei, haud articulati, stigmatibus linguiformibus haud conspicuis circiter 1·5 mm. longis terminati. *Fructus* plus minusve pyriformis, laevis nec carinatus, basin versus conspicue saepe longe (0·6–1·8 cm.) contractus, apice in collum vulgo insigniter angustum subconicum usque 1·5 cm. longum stylis terminatum attenuatus, 3·5–6·5 cm. longus, fere ad 3 cm. diametro; reliquiae floris sub fructu persistentes.

British Guiana. Simuni Creek, Rupununi River, on gravelly soil on low hill, in miscellaneous forest, Aug. 1931, *Davis* in *Forest Dept.* no. 2143 (type), ♂. Kamwatta Creek, Koirimap River, Pomeroon River, in hilly land, July 1918, *Hohenkerk* in *Forest Dept.* no. 140 A, ♀; 140 B, ♂. Mazaruni Station, in old second-growth forest, June 1933, ♀ fl. and fr., *Tutin* 175 (Brit. Mus., Kew, type of fruit); *ibid.*, Sept. 1918, leaves and drawings of ♀ fl. and fr., *Leechman* XI. Bootooba, Demerara River, on sand-hill, fr. August 1924, *Persaud* 115.

This, as it seems, very distinct species is noted as a small tree, about 30–60 ft. high, with stilt roots (*Davis*), and smooth grey

bark and yellow latex (*Tutin*). Davis described his ♂ flowers as white and strongly-scented, whereas the ♀ flowers of Tutin's collection were noted as green and those of Persaud's as brown ; in the latter collection the flowers were no doubt old and withered. In numerous characters, as may be seen from the key, this species approaches the very different-looking *T. Choisyana* and *T. obovata*.

5. **T. brevistaminea** *Engl.* l.c. 446, t. 96, f. 3, et l c. 207 ; Vesque, l.c. t. 90 et l.c. 194 ; Eyma, l.c. 42 et l.c. 103.—*T. Jenmani* Engl. l.c. 447 ; Vesque, l.c. 202. *T. guianensis* Pl. et Tr. l.c. 268, quoad exempl. Schomburgk., non Aubl.

Pomeroon River, *Richard* and *Robert Schomburgk* 893 and 1401 (type no.), ♂ ; do., Kamwatta Creek, June 1918, *Hohenkerk* in *Forest Dept.* no. 727, ♂ and ♀ ; do., Dec. 1922, *la Cruz* 3174 (New York), ♀. Yarikita-Arawau River, North-west District, May 1929, *Martyn* 67, ♀. Barama River, North-west District, Dec. 1910, *C. W. Anderson* in *Forest Dept.* no. 962, ♀. Mount Terminus, Barima River, North-west District, May 1907, *Ward* and *Kortright* in *Jenman Herb.* no. 8652, ♀. Macouria River, Essequibo River, Nov. 1886, *Jenman* 2418, ♂. Mazaruni River, Sept. 1880, *Jenman* 659 (type of *T. Jenmani*), ♀.

From the evidence of field-notes this species is a large shrub or small tree reaching a height of about 20 ft.

Distr. Surinam. Brazil, according to Vesque.

Examination of the above specimens has led to the conviction that they represent a single species which is noteworthy for the globose, rounded-obtuse buds and the few, stout, club-shaped stamens with small anther-thecae widely separated by the connective. The fruits of our specimens are rather small and distinctive, 3 cm. long or often shorter (+ 4 cm., *Eyma*), up to 2 cm. diam., ovoid-subglobose or ovoid-ellipsoid, contracted at both ends but especially so at the apex. The material presents variability in two characters which calls for mention. In the first place, as with other species (cf. *T. cephalostigma*), the female inflorescence has much larger buds, sepals and petals, and longer filaments than the male. It was, no doubt, mainly owing to his failure to realise this natural condition in a *Tovomita* that Engler was induced to describe a new species, *T. Jenmani*, on the evidence of a single collection with female inflorescence. Secondly, there is a perplexing variability in the angle and direction of the main lateral nerves of the leaves, which as usual are most easily examined on the lower surface. These nerves, which leave the midrib either at a wide or at a distinctly acute angle, may proceed to the margin in a line which is practically straight, or may curve up to it from almost half way. The extremes of this variability are met with in the type material of *T. brevistaminea* and *T. Jenmani*, so that Engler may well be excused for keeping them separate. The variability in the direction of the nerves of this species, coupled with the frequent prominence of the secondary lateral nerves, has led authors to place it among species of Vesque's

section *Clusiifoliae*, whereas it appears to fall quite as naturally into the *Chrysochlamydifoliae* near *T. Schomburgkii* and the true *T. guianensis*, a situation which renders untenable the present constitution of these sections.

6. **T. Schomburgkii** *Pl. et Tr.* l.c. 274 ; Engl. l.c. 448 et 207 ; Vesque, l.c. tt. 98, 99, et l.c. 212 ; Sandwith, l.c. 177 ; Eyma, l.c. 107.—*T. Schomburgkiana* et *T. hameliaefolia* Klotzsch in Rich. Schomb. Reisen, **3**, 996 (1848), fide Engl., nomina.

A small tree, apparently frequent in various types of coastal forest. Schomburgk's original collections were from the Pomeroon district. The species has recently been collected so far inland as the Simuni Creek, Rupununi district, by *Davis* in *Forest Dept.* no. 2128.

Distr. Surinam. Amazonian Brazil, fide Eyma.

In this well-marked species the resin-ducts are conspicuous on the lower surface of the leaves.

7. **T. macrophylla** *Walp.* Rep. **1**, 392 (1842) ; Pl. et Tr. l.c. 279 ; Engl. l.c. 452 et l.c. 207 ; Vesque, l.c. tt. 101, 102, et l.c. 217. —*Marialvaea macrophylla* Poepp. et Endl. Nov. Gen. et Sp. **3, 14** (1845).

River-bank, Blue Mountain, Essequibo Co., August 1924, *Persaud* 118.

Distr. Amazonian Brazil and Venezuela.

The solitary collection cited above has branchlets, leaves and fruit only, and it is hoped that flowering material will eventually confirm the identification. As the name indicates, this is a species with large leaves, the smallest being at least 15 cm. long and 7 cm. wide ; the midrib and main lateral nerves are very conspicuously raised on the lower surface, which is also remarkable for the copious black dotting which, in Vesque's opinion, is caused by " lenticelles, compliquées d'une sécrétion résineuse." The ripe fruit of *Persaud* 118 at Kew is mutilated at the apex ; otherwise it is pearshaped, 3·7–4 cm. long and about 3 cm. diam., contracted into a broad base which is surrounded by the remains of the flower (cf. the fruits of *T. Choisyana* and *T. obovata*).

8. **Tovomita** (§ " *Chrysochlamydifoliae* ") **calodictyos** *Sandwith*, sp. nov.; *T. macrophyllae* Walp. affinis, praesertim foliorum venatione subsimili, sed nervis primariis satis longe a margine anastomosantibus nervo marginali conspicuo, pagina inferiore epunctata multo intricatius atque prominentius reticulata, floribus multo minoribus, petalis 4, staminibus paucioribus differt.

Arbor parva, ramulis summis glabris teretibus sed apicem versus compressis. *Folia* vulgo magna, elliptica vel elliptico-oblanceolata, apice longe (1·2–2 cm.) acute acuminata, basi acute cuneata vel obtusa vel fere rotundata, 15–31·5 cm. longa, 4·5–13·3 cm. lata, chartacea, glabra, subtus haud punctata, nervis venulisque omnibus

supra prominulis subtus prominentibus, nervis primariis numerosis utroque costae latere 16–22 prope medium folium a sese 1–2 cm. distantibus patulis tum nervo marginali conspicuo satis longe (prope medium folium vulgo 5–8 mm.) a margine ipso conspicue anastomosantibus et sursum arcuatis, nervis secundariis permultis aliis e costa angulo recto exorientibus tum abrupte versus primarios deorsum curvatis aliis numerosissimis inter primarios regulariter descendentibus plus minusve parallelis, omnibus cum venulis tertiariis utrinque rete intricatissimum formantibus ; petiolus ad 2·5 cm. longus. *Inflorescentiae masculae* tantum visae, evolutae adultae ad 12·5 cm. longae, axi valde compresso nodis ternatim usque senatim ramoso, ramis ipsis similiter ramosis, pedicellis 4–8 mm. longis ; bracteae delapsae ; bracteolae alabastra involventes, membranaceae, pallide brunneae, ovatae, apice in apiculo alabastri connatae, igitur cito calyptratim caducae. *Alabastra* ovoidea, apiculata, 4·5–6 mm. longa, ad 4·5 mm. diametro. *Sepala* 4 ; 2 exteriora crassa, valde concava, florem involventia, ovata, 5–7 mm. longa, 4–5·5 mm. lata ; 2 interiora petaloidea, ovata, 5·5–6 mm. longa, ad 3·5 mm. lata. *Petala* 4, sepalis decussata, oblonga, firma, 5–7 mm. longa, 2·5–3 mm. lata. *Stamina* circiter 30, inaequalia ; filamenta 2·5–4·5 mm. longa ; antherae circiter 0·6 mm. longae, filamentis haud latiores.

British Guiana. Tiger Creek, Essequibo River, Nov. 9th, 1930, *Brinsley* in *Forest Dept.* no. 1002 (type), 1003 : a small tree, growing on brown sand.

A very distinct species on account of the large papery leaves with numerous widely separated main lateral nerves which anastomose at a conspicuous distance from the margin, the direction of the minor nerves which is very similar to that of *T. macrophylla*, and the comparatively small flowers.

9. **T. Choisyana** *Pl. et Tr.* l.c. 281 ; Engl. l.c. 208 ; Eyma, l.c. 45 et l.c. 106.—*Micranthera clusioides* Choisy in Mém. Soc. Hist. Nat. Paris, **1**, 210 (1823–24), partim excl. syn. Rich.

Kamwatta Creek, Koirimap River, Pomeroon River, July 1918, *Hohenkerk* in *Forest Dept.* no. 453A, 453B, both ♀ with fl. and fr.

Distr. Guiana.

Some doubt attaches to the above identification since the material is incomplete. It has been compared with Eyma's recent description and with Surinam specimens cited by him. *T. Choisyana* might be confused with *T. Schomburgkii* ♀ but should be distinguished, in addition to characters given in the key, by the styles being not articulate below the stigmas. It is in reality very closely allied to the next species.

10. **T. obovata** *Engl.* l.c. 451 et l.c. 207 ; Vesque, l.c. 220.—? *T. macrophylla* Klotzsch, l.c., nomen.

Pomeroon River, *Richard* and *Robert Schomburgk* 878 and 1365B (type nos.) ; July, 1918, *Hohenkerk* in *Forest Dept.* no. 728. Weri-

Werai-Kuru Creek, Essequibo River, April 1922, *Hohenkerk* in *Forest Dept.* no. 453C. Moraballi Creek, Essequibo River, Sept. 1929, *Sandwith* 349. Karaow Creek, Mazaruni Station, Sept. 1918, *Leechman* XII. Yampari Creek, 20 miles S.W. of Georgetown, May 1929, *Forest Dept.* no. 938. Christianburg, Demerara River, Feb. 1910, *C. W. Anderson* in *Forest Dept.* no. 453.

Distr. At present recorded only from British Guiana. The *T. obovata* of Pulle's Enum. Pl. Surinam, p. 307 (1906) is referred by Eyma to *T. Choisyana*.

This fine species, the Broad-leaved or Large-leaved Awasakuli, is easily known by its large leathery leaves and large flowers. It is strongly and conspicuously stilt-rooted, and sometimes grows to a considerable height, but it is rarely a tree of timber size, and the diameter above the stilts does not normally exceed a foot. The blaze yields a thick, pale yellow or café-au-lait latex. Although this species is frequent on the banks of small creeks and gullies it is not, according to the Forest Department, typically a swamp tree.

The fruit of *T. obovata* (see *Forest Dept.* 453C.) is very similar to that of *T. Choisyana* as described by Eyma (and see *Forest Dept.* 453 A, B) ; it is, in fact, difficult to find good and mutually exclusive characters for distinguishing these two species. In addition to the shape, texture and venation of the leaves, one may perhaps use, on present evidence, the longer, stouter male inflorescence, with larger, more ovoid, and usually distinctly apiculate buds, of *T. obovata*.

XXII—AFRICAN ORCHIDS: VIII* V. S. Summerhayes.

Disa (§ **Calostachys**) **subaequalis** *Summerhayes*, sp. nov. ; affinis *D. Schimperi* N.E.Br. et *D. Welwitschii* Rchb. f., ab illa planta graciliore, petali lobo postico antico paulo tantum longiore lanceolato subacuto, ab hac inflorescentia longiore, petali lobo postico lanceolato subacuto nec dilatato rotundato differt.

Herba terrestris, 20–70 cm. alta ; tuber ovoideum, 2·5 cm. longum, 1·5 cm. diametro ; caulis fertilis erectus, gracilis vel crassiusculus, per totam longitudinem vaginis ovatis vel lanceolatis inferioribus obtusis superioribus acuminatis foliaceis supremis bracteiformibus obtectus. *Folia* e caule sterili brevi 6–7 cm. longo orta, linearia, acuta, 15–30 cm. longa, 6–13 mm. lata. *Inflorescentia* cylindrica, dense vel subdense multiflora, 7–20 cm. longa, 2–3·5 cm. diametro ; bracteae lanceolatae, acuminatae, floribus aequilongae vel inferiores flores superantes ; pedicellus cum ovario 1–1·5 cm. longus. *Flores* suberecti, rosei vel purpurascentes. *Sepalum* intermedium erectum, vix unguiculatum, elliptico-obovatum, obtuse rotundatum, 6–9 mm. longum, 4–7 mm. latum, valde concavum, infra medium calcari pendulo apicem versus leviter dilatato 4–7 mm. longo instructum ; sepala lateralia patentia, elliptica vel oblongo-

* Continued from K.B. 1935, 204.

elliptica, subacuta usque rotundata, basi leviter obliqua, 7–12 mm. longa, 3·5–6·5 mm. lata. *Petala* erecta, ambitu auriculiformia, basi margine postico columnae adnata, valde obliqua, margine antico ± cordata, dimidio superiore bilobata, lobo postico lanceolato vel oblongo-lanceolato subacuto 1·5–4 mm. longo, lobo antico postico breviore semiorbiculari rotundato, petala tota 5·5–8 mm. longa, 3–5·5 mm. lata. *Labellum* pendulum, simplex, lanceolato- vel oblanceolato-lineare, acutum, 6–10 mm. longum, 0·7–0·9 mm. latum. *Anthera* erecta, 3·5–4·5 mm. alta, loculis parallelis; rostelli lobus intermedius triangularis, obtusus; stigma pulvinatum, fere orbiculare.

Northern Nigeria. Vom, Bauchi Plateau, in swamps, 900–1350 m., *Dent Young*.

Southern Nigeria. Bamenda District, Basenako to Lakom, on grassy stony slope, 1500–1800 m., June 1931, *Maitland* 1545; 1616; Bamenda District, no exact locality, *Johnstone*.

Uganda. Masaka, Sango Bay, on boggy land, 1100 m., Oct. 1925, *Maitland* 911; Kyagwe, near Ntakafumu, in grassy stretch, 1200 m., April 1914, *Dummer* 738 (type); Lira, July 1931, *Hancock* 2224.

Kenya Colony. Nandi, in swamp, 1950 m., Aug. 1933, *Dale* 3167a; Trans-Nzoia, swamps, 1800–1900 m., June 1932, *Tweedie* 35, July 1932, *Tweedie* 40. Kipkarren, in wet ground, June and July, *Brodhurst Hill* 69, 70; Londiani, in grasslands, 2280 m., July 1932, *Graham* 2883.

Tanganyika Territory. Bukoba, Jan. 1934, *Mainwaring*, (Coryndon Museum, Nairobi, No. 6006); Bukoba, Ngono swamp, Uganda Road, 1200 m., Jan. 1932, *Haarer* 2433.

This is clearly a common plant of swamps and wet grasslands at moderate altitudes around Lake Victoria. The colour of the flowers varies from pink to various shades of mauve and magenta.

Nervilia Afzelii *Schltr.* in Engl. Bot. Jahrb. **45,** 402 (1911), var. **grandiflora** *Summerhayes*, var. nov.; a typo flore 2 cm. longo differt.

French Guinea. Faranna, May 1905, *Chevalier* 13406.

Characterised by the much larger flower, which, however, has the same structure as that of the type. This plant has been named *Pogonia Fineti* by A. Chevalier in Explor. Bot. Afr. Occ. Franç. **1,** 620 (1920), but without any description.

Auxopus kamerunensis *Schltr.* in Engl. Bot. Jahrb. **38,** 4 (1905), var. **grandiflora** *Summerhayes*, var. nov.; a typo floribus 6–7 mm. longis differt.

Ivory Coast. Makougnié railway station, at 75 kilometre point, Jan. 1907, *Chevalier* 17025.

Eulophia R.Br.

After many years of study of this genus and of the allied genus *Lissochilus* R.Br. I have come to the conclusion that they cannot be

kept distinct, at all events, as at present constituted. There are undoubtedly tendencies among the African species of *Eulophia* for the sepals and petals to be unlike in shape, size and colour, for the former to become reflexed to varying degrees and for the lip to be pandurate with the lateral lobes or basal auricles rounded and more or less enveloping the column. Most of the groups showing these features to various extents have been classed as *Lissochilus*, but in my opinion these do not represent a natural genus. The " genus " rather consists of the end members of a number of series starting from different basic points within the genus *Eulophia* and evolving along parallel lines of development.

It is interesting to note that the divergence between sepals and petals has not always progressed in the same direction. In many groups referred usually to *Lissochilus* the petals are distinctly longer as well as broader than the sepals in addition to being differently coloured. In the large group of species allied to *Eulophia longisepala* Rendle, including, for instance, *E. triceras* Schltr., *E. Stolzii* Schltr. and *E. brevipetala* Rolfe, the sepals are much longer and narrower than the petals and are somewhat reflexed. This group, however, has always been included in *Eulophia*, although it is difficult to see how it can be excluded technically from *Lissochilus*. On the other hand *E. cristata* Steud. (*Lissochilus purpuratus* Lindl.), which is always included in *Lissochilus* by those who maintain that genus, has the sepals and petals only slightly different in shape and colour although the sepals are certainly reflexed.

It therefore seems most logical to include all the species of *Lissochilus* in *Eulophia* until it is possible to carry out a complete revision of *Eulophia*. It may then be possible to divide the genus into separate groups one of which may be a reconstituted *Lissochilus*.

Eulophia oedoplectron *Summerhayes*, nom. nov. *Lissochilus macranthus* Lindl. Gen. & Sp. Orch. 191 (1833). *L. elatus* Rolfe in Dyer, Fl. Trop. Afr. **1**, 87 (1897).

Since the trivials *elata* and *macrantha* have been used already in *Eulophia* a new name is necessary for this species. The differences between the two species as given by Rolfe are largely a matter of degree ; there are no real structural differences.

E. latilabris *Summerhayes*, nom. nov. *Lissochilus Schweinfurthii* Rchb. f. Otia Bot. Hamburg. **1**, 60 (1878).

Owing to the existence of *E. Schweinfurthii* Kraenzl. a new trivial is needed for the above species. The very broad lip is a characteristic feature of the species.

E. Horsfallii *Summerhayes* in Hutch. and J. M. Dalz. Fl. W. Trop. Afr. **2**, 444 (1936). *Lissochilus Horsfallii* Batem. in Bot. Mag. t. 5486 (1865). *L. roseus* Lindl. in Bot. Reg. 1843, Misc. p. 25, quoad descr., non *Dendrobium roseum* Sw.

Dendrobium roseum Sw. is a synonym of *Polystachya galeata*

Rchb. f. and the combination *Lissochilus roseus* (Sw.) Lindl. (based on *D. roseum*) must therefore be retained for the same species, although Lindley had quite a different plant in mind. After examining a large number of species I have been unable to find any satisfactory differences between *L. Horsfallii* and *L. roseus*. In some specimens the lip and sepals are relatively narrower and the sepals have a longer acumen or apiculus than in others, but many intermediates occur and sometimes the lip and sepal characters are not correlated.

Among the specimens referred to *L. roseus* in the Kew Herbarium there are, however, a number in which there is good correlation between several characters, viz. small flowers, very blunt sepals not much narrowed towards the base and a constantly shaped lip. This seems to be a new species which I am accordingly describing below. It will be seen that although the flowers are always smaller than in *E. Horsfallii* the inflorescence is equally tall; there is therefore no likelihood of the species representing a series of starved or poorly developed specimens.

E. Barteri *Summerhayes*, sp. nov.; affinis *E. Horsfallii* (Batem.) Summerhayes, a qua floribus minoribus, sepalis cuneato-obovatis obtusis basi sensim angustatis differt.

Herba terrestris, paludicola. *Tubera* ignota. *Caulis* pseudobulbosus, plurifoliatus. *Folia* longe petiolata, lanceolata, acutissima, in toto 40-100 cm. longa, 3–8 cm. lata, plicata. *Scapus* erectus, robustus, teres, 1–2 m. altus, pedunculo vaginis elliptico-ovatis obtusis vel apiculatis remotis instructo; racemus 15–35 cm. longus, multiflorus; bracteae e basi angusta obovatae vel oblanceolatae, longe apiculatae vel breviter acuminatae, 1–2.5 cm. longae, usque ad 1 cm. latae. *Flores* erecto-patentes, purpurei vel partim albi; ovario pedicellato 2–3 cm. longo. *Sepala* cuneato-obovata, obtusa, lateralia leviter obliqua, valde reflexa, 13–17 mm. longa, 5–8 mm. lata. *Petala* orbiculari-elliptica vel saepius fere orbicularia, apiculata, 13–18 mm. longa, 12–17·5 mm. lata. *Labellum* trilobum, 16–24 mm. longum, 15–24 mm. latum; lobi laterales ± semiorbiculares, margine antico leviter truncato; lobus intermedius obovato-oblongus, obtusus vel rotundatus, 8–12 mm. longus, 8–13 mm. latus; labelli discus medio carinis tribus semicircularibus antice in carinas humiles ± verrucosas usque ad dimidium lobi intermedii decurrentibus instructus; calcar conicum, acutum, 4–6 mm. longum. *Columna* leviter incurvata, 8–10 mm. longa. *Anthera* conico-hemisphaerica, breviter bicornis; pollinia ovoidea, 1·8 mm. longa, stipite oblongo-ovato, viscidio leviter lunato utrinque acuto.

Sierra Leone. Northern Province, Mapaki, swamp, Aug. 1928, *Deighton* 1213; Giema, marshes, frequent, Nov. 1926, *Deighton* 364; Bobobu, swamp, June 1918, *Aylmer* 607; no locality, *Smythe*.

Ivory Coast. Near Férédougouoa River, by path to Touba, 525 m., July 1926, *Collenette* 66.

Gold Coast. Kintampo, in swampy areas, 330 m., July 1935, *Vigne* 3935.

Northern Nigeria. Nupe, margin of a swampy ravine, *Barter* 1481 (type); Sare, side of a rivulet, *Barter* 3429.

E. caricifolia *Summerhayes* in Hutch. and J. M. Dalz. Fl. W. Trop. Afr. **2**, 444 (1936). *Lissochilus caricifolius* Rchb.f. in Linnaea, **41**, 74 (1877). *L. longifolius* Benth. in Hook. Niger Flora, 530 (1849).

The name *Eulophia longifolia* being already in use for another species it is necessary to adopt the trivial "*caricifolia*" for this species. In the Flora of Tropical Africa Rolfe states of *L. caricifolius* "it is said to be allied to *L. longifolius* Benth. but the lip is very different." Reichenbach's description appears to me to fit very well the lip in our species and I feel that Rolfe's opinion is merely a matter of misinterpretation of the author's meaning. The number of keels on the middle lobe of the lip varies from 3–7 although there are only three in the lower part of the lip.

E. involuta *Summerhayes*, nom. nov. *Lissochilus Smithii* Rolfe in Dyer, Fl. Trop. Afr. **7**, 96 (1897).

The existence of *Eulophia Smithii* Rolfe on p. 54 of the above work renders a new name necessary for the species under consideration. This is the first record from West Africa of a member of the yellow-flowered group of species. The name is given in allusion to the rolled-up narrowly linear leaves.

E. Millsoni *Summerhayes* in Hutch. & J. M. Dalz. Fl. West Trop. Afr. **2**, 446 (1936). *Lissochilus Millsoni* Rolfe in Dyer, Fl. Trop. Afr. **7**, 79 (1897). *L. lacteus* Kraenzl. in Engl. Jahrb. **43**, 398 (1909). *L. Andersoni* Rolfe in Kew Bull. 1910, 159. *L. Johnsoni* Rolfe, l.c. 160. *Eulophia tuberifera* Kraenzl. in Engl. Jahrb. **28**, 169 (1900).

I have no doubt after examination of type specimens and descriptions that all the above "species" are conspecific. The number of verrucose keels on the middle lobe of the lip varies considerably while they may be either the same colour as the ground colour of the lip or tinged mauve or reddish. The spur also may sometimes be a little longer and more acute in some individuals than in others. In other respects there is no structural difference whatever between the various specimens.

Rhipidoglossum laxiflorum *Summerhayes*, sp. nov.; a *R. xanthopollinio* (Rchb. f.) Schltr. floribus minoribus, calcari multo breviore, a *R. rutilo* (Rchb. f.) Schltr. foliis angustioribus, floribus laxioribus, calcari multo breviore, a *R. Peglerae* (Bolus) Schltr. foliis angustioribus, labello et calcari minoribus, pollinii stipitibus brevioribus et crassioribus differt.

Herba epiphytica, parva, caule suberecto 4–5 cm. longo 2–3 mm. diametro apice plurifoliato. *Folia* ligulato-linearia, inferne leviter angustata, apice breviter inaequaliter obtuse vel subacute bilobata, 4–11 cm. longa, 5–9 mm. lata. *Inflorescentiae* suberectae, leviter flexuosae, 4–11 cm. longae, usque 20-florae; bracteae minutae, vaginiformes, ± truncatae; pedicelli cum ovariis 1–2 mm. longi.

Flores subpatentes, 4–6 mm. distantes, viridi-albi. *Sepalum* intermedium ellipticum, apice rotundatum, 1·7 mm. longum, 1·3 mm. latum ; sepala lateralia oblique elliptico-ovata, apice rotundato-obtusa, 2 mm. longa, 1·2 mm. lata. *Petala* fere orbicularia, vix 2 mm. longa et lata. *Labellum* transverse elliptico-oblongum, basi in calcar sensim transiens, apice breviter et late apiculatum, 1·6 mm. longum, 2·7 mm. latum ; calcar cylindricum, medio leviter constrictum, incurvatum, 1·8 mm. longum. *Columna* brevis, dorso semiteres, 1 mm. longa ; anthera non visa ; pollinii stipites 2, separati, versus basin angustati ; viscidia 2, distincta, elliptica ; rostellum productum, integrum, acutum.

Ivory Coast. Country of the Dyolas, summit of Mt. Goula near Danané, 445 m., April 1909 (in fruit), *Chevalier* 21213.

Gold Coast. Aburi Gardens, on coffee trees, March, 1902, *Johnson* 858 (type).

A rather insignificant species remarkable chiefly on account of the very small flowers with short spur only a little longer than the lip, combined with a relatively lax-flowered inflorescence and narrow leaves. The orbicular petals and the lip much broader than long show it to be a typical member of the genus.

Rhipidoglossum longicalcar *Summerhayes*, sp. nov.; affine *R. rutilo* (Rchb. f.) Schltr., a quo foliis acutis, labello longiore quam lato apice leviter emarginato, calcari plus quam 1 cm. longo, viscidiis majoribus satis distinguendum.

Herba epiphytica, caule erecto vel repente 5–6 cm. longo usque 8-foliato inferne radicibus flexuosis glabris instructo. *Folia* vaginis arcte imbricatis, lineari- vel oblongo-oblanceolata, interdum leviter curvata, apice inaequaliter et obscure bilobata, lobo longiore acuto breviore fere nullo, 7–13 cm. longa, 6–16 mm. lata. *Inflorescentiae* patentes vel subpendulae, graciles, 5–15 cm. longae, fere per totam longitudinem sublaxe multiflorae. *Flores* patentes, pallide virides. *Sepalum* intermedium ellipticum, rotundato-obtusum, 2·5–3 mm. longum, circiter 1·5 mm. latum ; sepala lateralia oblique oblonga, obtusa, circiter 3·7 mm. longa, circiter 1·5 mm. lata sed intermedio paulo angustiora. *Petala* orbiculari-ovata, apice rotundata, leviter obliqua, circiter 2·3 mm. longa et lata. *Labellum* e basi angusta quadratum, antice angustatum, apice truncatum et leviter retusum interdum apiculo in sinu interjecto praeditum, 3–3·5 mm. longum, 2–2·5 mm. latum ; calcar e basi latiore anguste cylindricum, obtusum, 11–14 mm. longum. *Columna* brevis, apice valde dilatata, 1 mm. longa ; anthera non visa, delapsa ; pollinia ellipsoidea, stipitibus 2 linearibus superne paulo latioribus 0·5 mm. longis, viscidiis 2 distinctis curvato-ellipticis 0·4 mm. longis instructa.

Southern Nigeria. Oban District, no exact locality, 1911, *Talbot* 937 ; Kwa River, Obutong Beach, common, *Talbot* 939 (type). (Both specimens in Herb. Mus. Brit.).

This rather interesting species is characterised by the quadrate lip, which is longer than broad and truncate at the apex, the two

angles being acute and slightly curved outwards and the shallow sinus sometimes being furnished with an apiculus, and by the long slender spur. In other species of *Rhipidoglossum* which I have examined the lip is broader than long, but the floral structure is otherwise very similar to that of *R. longicalcar*.

Rangaeris *Summerhayes*, gen. nov.

Sepala et petala e basi conniventia ± patentia, lanceolata, ± inter se similia ; sepala laterialia rarius e pede columnae exorta. *Labellum* sepalo intermedio vulgo simile sed saepius latius, lanceolatum vel ovatum, rarius basi trilobum lobis lateralibus brevibus rotundatis ; calcar ex ore saepius angusto cylindricum nec dilatatum. *Columna* brevis vel longiuscula, apoda vel pede brevi instructa ; rostellum deorsum productum, primo indivisum, viscidio amoto bi- vel trilobum. *Anthera* cucullata, in rostrum latum obtusum vel truncatum producta ; pollinia globosa vel ellipsoidea, stipitibus 2 distinctis linearibus vel oblanceolatis, viscidio communi saepius quadrato vel cordato vel viscidiis 2 ± distinctis parvis ellipticis instructa.

Plantae epiphyticae ; caulis ± elongatus vel rarius brevissimus, bene foliatus ; folia coriacea, ligulata vel oblanceolata, acuta, obtusa vel inaequaliter bilobata ; inflorescentiae racemosae, suberectae vel arcuato-patentes, sublaxe pluri- vel multiflorae ; flores parviusculi vel rarius majusculi, albi vel flavidi, erecto-patentes vel patentes, pedicello cum ovario bracteam superante.

Species circiter 16 adhuc notae, Africae tropicae et insulae Madagascariae indigenae.—*Aerangis* Rchb.f., Sect. *Rangaeris* Schltr. in Beih. Bot. Centralbl. **36,** II, 113, 121–123 (1918).

Species typica.—*R. muscicola* (Rchb.f.) Summerhayes.

When Schlechter first elaborated the genus *Aerangis*, in his account of the Angraecoid Orchids (see above), he divided it into two sections, namely, *Eu-Aerangis*, characterised by a single stipes to the pollinia, and *Rangaeris*, in which each pollinium has its own stipes, there being either a common viscidium or more rarely two separate ones. An examination of the species shows that there are other characters associated with these, the members of the two sections being readily recognisable on inspection.

Recently I have come across a number of other species, several new to science, others omitted altogether by Schlechter, which apparently fall into the second section. On careful examination I have decided that it is more logical to separate this section as a distinct genus since the species really show little resemblance to *Aerangis* proper but in some ways approach other genera. The genus *Aerangis*, as now restricted to Schlechter's section *Eu-Aerangis*, is a well-defined and very natural group. The separation of *Rangaeris* is therefore justified on these grounds alone ; its inclusion in *Aerangis* would always make difficult any exact definition of that genus. On the other hand *Rangaeris* is a rather heterogeneous assemblage composed of several groups of closely allied species. Whether it will

be possible to maintain it when further discoveries, which are inevitable, are made and further investigations have been carried out, is open to question. As the detailed classification of the Angraecoid Orchids is still a matter for considerable investigation I do not propose to allocate to *Rangaeris* any exact position in Schlechter's scheme.

I have already (Hutch. & J. M. Dalz. Fl. West Trop. Afr. **2,** 449: 1936) transferred four species to *Rangaeris*, namely, *R. longicaudata* Summerhayes (*Mystacidium longicaudatum* Rolfe), *R. muscicola* Summerhayes (*Aëranthus muscicola* Rchb.f.), *R. rhipsalisocia* Summerhayes (*Angraecum rhipsalisocium* Rchb.f.) and *R. Dorotheae* Summerhayes (*Angraecum Dorotheae* Rendle). The following new combination should also be made :—

Rangaeris brachyceras *Summerhayes*, comb. nov. *Aerangis brachyceras* Summerhayes in Kew Bull. 1934, 213.

I do not propose to transfer formally the remainder of the species of *Aerangis* sect. *Rangaeris* to the new genus as I have not seen a few of them and am doubtful of the specific distinctness of the others. The descriptions of two new species follow.

Rangaeris biglandulosa *Summerhayes*, sp. nov. ; affinis *R. brachycerati* Summerh., a qua foliis latioribus, perianthii segmentis acutioribus, columna pede fere 1 mm. longo sepala lateralia gerente instructa, viscidiis distinctis distinguitur.

Herba epiphytica ; caulis brevis, erectus, circiter 4–5 cm. longus, inferne radicibus numerosis flexuosis dense pubescentibus instructus, apice circiter 5-foliatus. *Folia* suberecta, basi imbricata et breviter vaginantia, oblongo-ligulata, dimidio inferiore sensim angustata, apice obtuse inaequaliter bilobata sinu parvo vel subnullo, 9–14 cm. longa, 14–17 mm. lata. *Inflorescentiae* erectae vel suberectae, foliis aequilongae vel paulo breviores, sublaxe multiflorae ; pedunculus gracilis, 3–4 cm. longus, vaginis 1–2 arctis instructus ; rhachis gracilis ; bracteae lanceolatae vel ovato-lanceolatae, acutae, 1–4 mm. longae ; ovarium cum pedicello 5–6 mm. longum. *Sepalum* intermedium oblongo-lanceolatum, breviter acuminatum, 5·5–6 mm. longum, 1·5 mm. latum ; sepala lateralia columnae pedi affixa, subfalcatim lineari-lanceolata, acuta, 6·5 mm. longa, 0·8 mm. lata. *Petala* oblique triangulari-lanceolata, acuta, 5–5·5 mm. longa, 1·7 mm. lata. *Labellum* concavum, explanatum ovato-lanceolatum, breviter acuminatum, 6 mm. longum, 2–2·5 mm. latum ; calcar fere rectum, e basi lata constrictum, dimidio superiore leviter clavato-inflatum, 5·5 mm. longum. *Columna* fere teres, 1·7 mm. longa, pede 0·7 mm. longo. *Anthera* hemisphaerica, antice producta ; pollinii stipites lineares, inferne leviter angustati ; viscidia distincta, elliptica. *Rostellum* trilobum, lobo intermedio lanceolato-lineari lateralibus triangularibus leviter incurvatis fere duplo longiore.

French Guinea. Futa Djalon, plateau of Dalaba, Diaguissa, 1000–1300 m., Oct. 1907, *Chevalier* 18782 (Type in Herb. Mus. Paris.).

This is an extremely interesting discovery. The species is allied to *R. brachyceras* Summerhayes, but differs in a number of features as shown in the diagnosis, the most important being the very marked foot to the column, on which are borne the lateral sepals and the anticous halves of the petals, there being no vestige of such a foot in *R. brachyceras*. I have previously had difficulty in finding a foot to the column in some species of *Rhipidoglossum*, a genus said by Schlechter to possess one ; this and other evidence have made me suspect that the presence or absence of a foot is not of generic significance in Angraecoid orchids. The discovery of *Rangaeris biglandulosa* gives to this opinion much greater weight, since this species and *R. brachyceras* can scarcely be placed in separate genera without ignoring the very important features they have in common.

It seems probable that the group of genera separated out by Schlechter on account of the supposed diagnostic importance of the foot of the column will have to be reconsidered together with other genera which closely resemble them but which were placed in other groups by Schlechter.

Rangaeris trilobata *Summerhayes*, sp. nov. ; ab omnibus generis speciebus labello basi trilobato lobis fere orbicularibus crenatis differt.

Herba epiphytica, scandens ; caulis fere strictus, usque ad 60 cm. vel ultra longus, 2·5–3·5 mm. diametro, distanter foliatus, radices numerosas flexuosas ramosas emittens. *Folia* subpatentia, vaginis haud imbricatis, oblongo vel elliptico-lanceolata, 3–5 cm. distantia, apice acuta interdum breviter bifida, leviter recurvata, 6–8 cm. longa, 1–1·7 cm. lata. *Inflorescentiae* patentes, graciles, flexuosae, 3–5 cm. longae, 3–4-florae ; bracteae late ovatae, subacutae ; pedicelli cum ovariis circiter 1 cm. longi. *Sepalum* intermedium lanceolatum, apice late et obtuse acuminatum, circiter 7·5 mm. longum et 3 mm. latum ; sepala lateralia intermedio similia sed inferne obliqua, 8·5 mm. longa, 2·7 mm. lata. *Petala* anguste lanceolata, acuta, paulo curvata, 7·5 mm. longa, 1·5 mm. lata. *Labellum* e basi brevi angusta trilobatum, 8·5 mm. longum, circiter 4·5 mm. latum ; lobus intermedius lanceolatus, anguste sed obtuse acuminatus, 7 mm. longus, basi 1·5 mm. latus ; lobi laterales orbiculares vel orbiculari-ovati, leviter crenati, ab intermedio angulo fere recto divergentes, circiter 1·5 mm. longi et lati ; calcar gracile, cylindricum, circiter 5 cm. longum. *Columna* subteres, 3·5 mm. longa ; anthera non visa ; pollinia globosa, stipitibus duobus fere filiformibus circiter 2 mm. longis, viscidio communi fere oblongo postice bifido plus quam 1 mm. longo instructa ; rostellum deorsum productum, trifidum, partitionibus subaequilongis intermedia lineari.

Southern Nigeria. Eket district, 1912-13, *Talbot* 3299 (type in Herb. Mus. Brit. ; paratype in Herb. Kew.).

A very remarkable species which approaches most nearly in vegetative characters to *R. longicaudata* (Rolfe) Summerhayes, but has much smaller leaves and flowers. In fact it resembles very closely

Solenangis scandens Schltr. and *Dinklageella liberica* Mansf. in its long climbing stems and distantly placed narrowly-elliptical or lanceolate leaves, but is totally different from each in flower-structure. In this latter feature, with the exception of the trilobed lip, it agrees with *Rangaeris muscicola* (Rchb.f.) Summerhayes and *R. rhipsalisocia* (Rchb.f.) Summerhayes, especially in the column, pollinia and rostellum. The trilobed lip separates *R. trilobata* from all other species in the genus ; on the other hand its general shape and texture do not in the least recall to mind such genera as *Tridactyle* and *Angraecopsis* where the lip is usually trilobed.

Angraecum (§ **Eu-Angraecum**) **Chevalieri** *Summerhayes*, sp. nov. ; affine *A. multinominato* Rendle, a quo foliis lateribus fere parallelis, inflorescentiis duplo longioribus laxifloris, tepalis acuminatis, calcari apicem versus leviter inflato tantum differt.

Herba epiphytica, caule erecto 6–11 cm. longo per totam longitudinem foliato circiter 3 mm. diametro. *Folia* basi paulo imbricata, lineari-ligulata vel oblongo-linearia, basi leviter angustata, apice inaequaliter obtuseque bilobata, lobis interdum leviter divaricatis, 4–7 cm. longa, 6–10 mm. lata. *Inflorescentiae* suberectae, 3–4-florae ; rhachis gracilis ; bracteae late ovatae, basi vaginantes, acutae vel breviter acuminatae, 2–4 mm. longae ; pedicellus cum ovario fere 2 cm. longus. *Sepala* lanceolata, acuminata, lateralia leviter obliqua, circiter 1 cm. longa, 2 mm. lata. *Petala* anguste lanceolata, acuminata, sepalis paulo breviora, 1·2 mm. lata. *Labellum* ellipticum, apice subito acuminatum, 7·5 mm. longum, 3 mm. latum, medio carina humili instructum ; calcar filiforme, dimidio superiore leviter clavato-inflatum, leviter recurvatum, 16–17 mm. longum. *Columna* brevis, circiter 2 mm. longa ; anthera non visa ; rostellum fere usque ad basin bifidum, vix productum.

Ivory Coast. Haut Sassandra, Toura country, between Sogui and Koualé, May 1909, *Chevalier* 21690 (type in Herb. Mus. Paris.).

A small species with few-flowered inflorescences and almost parallel-sided leaves. It is clearly related to *A. multinominatum* Rendle and similar species.

Angraecum (§ **Eu-Angraecum**) **pyriforme** *Summerhayes*, sp. nov. ; affine *A. Egertonii* Rendle, a quo foliis anguste elliptico-oblongis duplo longioribus, labello ovato acuto, calcari breviore apice in saccum ellipsoideum dilatato differt.

Herba epiphytica, caule repente vel adscendente usque ad 11 cm. longo 2–4 mm. diametro superne foliato inferne radicibus flexuosis glabris instructo. *Folia* vaginis imbricatis, anguste oblonga vel elliptico-oblonga, leviter curvata, basi leviter angustata, apice inaequaliter et obtuse bilobata, lobis leviter conniventibus, 7–11 cm. longa, 1–2·2 cm. lata. *Inflorescentiae* suberectae, 2–4-florae, 2–4 cm. longae ; pedunculus 1–2 cm. longus, basi vagina tubulosa 2–3 mm. longa praeditus ; bracteae lanceolatae vel ovatae, pedicello cum ovario 7–12 mm. longo multo breviores. *Flores* suberecti, pallide

virides. *Sepalum* intermedium elliptico-lanceolatum, subacutum, circiter 10 mm. longum et 2·5 mm. latum ; sepala lateralia leviter curvato-lanceolata, acuta, 9 mm. longa, 2–2·5 mm. lata. *Petala* falcatim oblongo-lanceolata, subacuta, circiter 8 mm. longa et 1·5 lata. *Labellum* e basi angusta ovatum, acutum vel breviter acuminatum, 7·5 mm. longum, 4·5 mm. latum, carina humilis mediana e basi usque supra medium decurrente instructum ; calcar dimidio inferiore gracile, superiore ellipsoideo-dilatatum, obtusum, 11–11·5 mm. longum. *Columna* brevis, crassa ; anthera hemisphaerica, antice breviter subacute producta ; pollinia pyriformia, stipitibus 2 oblanceolato-ligulatis, viscidiis 2 distinctis oblongo-ellipticis instructa ; rostellum profunde bifidum.

Southern Nigeria. Oban district, 1911, *Talbot* 888 (type) ; Ijebu Province, Shasha Forest Reserve, on twig of undergrowth tree in primary rain forest, May 1935, *Richards* 3476. (both specimens in Herb. Mus. Brit.).

A not very striking member of § *Eu-Angraecum* closely related to several other West African species. It is probably most closely related to *A. Egertonii* Rendle from which it differs by the characters given in the diagnosis.

Microcoelia microglossa *Summerhayes*, sp. nov. ; *M. caespitosae* (Rolfe) Summerh. similis, sed sepalo intermedio suborbiculari, sepalis lateralibus magis obliquis, calcari fere duplo longiore, columna multo breviore crassa, rostello brevissimo, pollinii stipite brevi superne valde dilatato, viscidio reniformi-elliptico facile distinguendum.

Herba epiphytica, aphylla. *Caulis* brevissimus, erectus, usque ad 1 cm. longus, radices numerosas ramosas flexuosas glabras emittens. *Inflorescentiae* suberectae, graciles, circiter 5 cm. longae, circiter 12-florae ; pedunculus 12 mm. longus, vaginis tribus arctis distantibus instructus ; bracteae vaginiformes, obtusae, 1–1·5 mm. longae ; pedicellus cum ovario tenuis, 6–10 mm. longus. *Flores* patentes. *Sepalum* intermedium suborbiculare, apiculatum, 2·3 mm. longum, 2·2 mm. latum ; sepala lateralia valde oblique triangulari-ovata, acuta, 3 mm. longa, 2·8 mm. lata. *Petala* lanceolato-ovata, acuta, leviter curvata, 2·2 mm. longa, 1·3–1·4 mm. lata. *Labelli* lamina parva, triangulari-ovata, acuta, basi utrinque lobulo minuto instructa, 2 mm. longa, 1·3 mm. lata ; calcar lamina multo majus, ore fere 2 mm. diametro, e basi apicem versus per quadrantes tres inferiores sensim attenuatum, tum subconico-dilatatum, totum 1·5–2 cm. longum. *Columna* brevis, leviter incurvata, fere 2 mm. longa. *Anthera* semiglobosa, antice truncata ; pollinii stipes circiter 1 mm. longus, basi angustissimus, sursum valde dilatatus rhombiformis, viscidium reniformi-ellipticum, stipite triplo brevius. *Rostellum* antice productum, breve, bilobum, lobis subacutis ; stigma orbiculari-depressum.

Southern Nigeria. Oban District, 1911-1912, *Talbot*.

This species belongs to the group with very short stems. Its

most striking characteristics are the long spur with a short narrowly conical apex, the lamina of the lip being very small, the short column, the short and slightly downward-projecting rostellum and the pollinia. In external characters the species closely resembles *M. caespitosa* (Rolfe) Summerh., which, however, has a long slender column from near the base of which the upwardly directed long rostellum-lobes arise. With this is associated a long pollinia-stipes, which is sharply geniculate in the middle and provided with an elongated elliptical-lanceolate viscidium.

An examination of a number of species of the genus *Microcoelia* suggests the necessity of dividing it into several genera, the variation in the column and associated sexual organs being very great from one species to another. However, this can only be done satisfactorily by the comparison of a much greater number of species than I have been able to examine so far.

Tridactyle Wakefieldii *Summerhayes*, comb. nov. *Angraecum Wakefieldii* Rolfe in Dyer, Fl. Trop. Afr. 7, 146 (1897), partim ; descriptio ampliata.

Herba epiphytica, scandens, ultra 1 m. alta, caule longo gracili 1·5–3 mm. diametro radices numerosas flexuosas ramosas tenues emittente. *Folia* 1–2·5 cm. distantia ; laminae patentes vel leviter reflexae, oblongo-lanceolatae, lanceolatae vel ovato-lanceolatae, apice breviter, aequaliter vel paulo inaequaliter, acute bilobulatae, 1·5–3 cm. longae, 5–13 mm. latae : vaginae arctae, longitudinaliter pluricostatae, internodiis paulo breviores. *Inflorescentiae* racemosae, patentes, graciles, 4–6 cm. longae, laxe 4–6-florae, basi vaginis duabus membranaceis imbricantibus truncatis instructae ; bracteae praesertim inferiores vaginiformes, membranaceae, obtusae vel truncatae, usque ad 5 mm. longae. *Flores* ± erecti, albi, ovario cum pedicello 1–2 cm. longo. *Sepalum* intermedium oblongo-ellipticum, obtusum vel apiculatum, 3 mm. longum, 1·7 mm. latum, quinquenervium ; sepala lateralia oblique oblongo-lanceolata, subacuta, 4–4·5 mm. longa, 1·6 mm. lata, trinervia. *Petala* paulo oblique lanceolato-oblonga, obtusa vel subacuta, 3·5 mm. longa, 1·5 mm. lata. *Labellum* e parte basali concava ± elliptica anguste trilobatum, totum 1 cm. longum, inter apices loborum lateralium 1 cm. latum ; lobus intermedius lanceolato-ligulatus, acutus, 3·5 mm. longus, 1·2 mm. latus ; lobi laterales patentes lanceolato-lineares, apice leviter recurvati, 4·5–5 mm. longi, basi 0·6 mm. lati ; calcar ex ore circiter 2 mm. diametro sensim angustatum, filiforme, 6–7 cm. longum. *Columna* brevis, circiter 1 mm. longa ; anthera hemisphaerica, antice anguste et acute rostrata, pollinii stipite unico apice spathulato basi angustissimo, viscidio magno suborbiculari antice cordato ; rostellum deflexo-productum, latum, truncatum, bifidum.

Kenya Colony. Nyika Country, *Wakefield* (type) ; Mombasa, Nov. 1884, *Wakefield* (partly).

Zanzibar. No exact locality, May, *Vaughan* 2011 ; 2109.

Rolfe described his *Angraecum Wakefieldii* from two gatherings which are in the Kew Herbarium. One of these, labelled " Nyika Country, E. Trop. Africa. Rev. T. Wakefield. Comm. Col. Grant, Jan. 1876," consists of a sterile stem about 1 metre long bearing a few leaves, other detached ones being in a capsule. It is clear that the words " Stem long and climbing " in the description were drawn up from this specimen. The other sheet, labelled " From Rev. Thos. Wakefield, Mombasa, E. Trop. Africa : Nov. 1884," bears two fragments, one of which has two leaves and is obviously conspecific with the specimen on Sheet 1, although the leaves are a little broader. This specimen also bears a single sterile raceme which was clearly overlooked by Rolfe when he drew up his description. The other fragment consists of a short stem which, although in fruit, exactly matches the plant identified by Rolfe as *Angraecum aphyllum* Thouars (**Microcoelia aphylla** *Summerhayes*, comb. nov.) on p. 180 of the Flora of Tropical Africa. The last two lines of the description of *A. Wakefieldii*, dealing with the inflorescences and fruits, were evidently drawn up from this specimen. Two leaves from the other specimen on the sheet have been struck down in close proximity to this specimen of *M. aphylla* and were probably thought by Rolfe to belong to the specimen, although an examination shows without doubt that it is quite devoid of leaf-sheaths or any sign of a leaf and indeed has never borne any.

Angraecum Wakefieldii is therefore founded on a mixture, the vegetative characters being based on one species and the inflorescence and fruit on another, no flowers being present. However, from his comparison of the species with *A. clavatum* Rolfe (*Solenangis clavata* Schltr.), it is evident that Rolfe had in mind a leafy plant and only included the fragment of *M. aphylla* because he thought that the leaves mounted nearby belonged to it.

Quite recently Mr. & Mrs. J. H. Vaughan of Zanzibar have sent to Kew beautifully preserved flowering specimens of a climbing orchid. A comparison of these with the leafy specimens included in *Angraecum Wakefieldii* shows that they are undoubtedly conspecific. The single inflorescence-rhachis on Wakefield's Mombasa specimen agrees perfectly with the Zanzibar material. The structure of the flowers shows that the species is more correctly placed in *Tridactyle*, to which I have accordingly transferred it. I have also supplied an amended and complete description since the original one is so misleading.

T. Wakefieldii is very distinct in appearance from all other species of *Tridactyle* known to me and in general habit closely resembles the West African *Solenangis clavata* Schltr., *S. scandens* Schltr. and *Dinklageella liberica* Mansf. The extremely long spur and narrowly trilobed lip are distinguishing features, the latter being commonly found in *Tridactyle*.

XXIII—SECOND LIST OF FUNGI AND DISEASES OF ECONOMIC PLANTS IN TANGANYIKA TERRITORY.

G. B. WALLACE.

This list comprises records of fungi and diseases of economic plants which have been made since the preliminary list was compiled (Kew Bulletin, 1932, 28), up to the end of the year 1935.

With few exceptions the identifications have been made or confirmed by the staff of the Imperial Mycological Institute, Kew. Other authorities who have assisted with identifications are mentioned by name.

So far as possible the nomenclature adopted is that recommended by the Plant Pathology Committee of the British Mycological Society in their " List of Common Names of British Plant Diseases " as revised in 1934.

Acacia campylacantha *Hochst. ex A. Rich.*

In roots : *Ustulina zonata* Lév. Morogoro, 16.2.33. No. 1532.

Agave sisalana *Perrine* (Sisal).

In stump : *Aspergillus niger* van Tiegh. Ruvu, 20.9.34. Culture 200 ; *Podospora* sp. Ruvu, Nov. 1931. Cultures 111–113. Probably the same as *Hypocopra austro-americana* (Speg.) Sacc. var. *Agavis americanae* Speg.

Asparagus officinalis *L.*

On leaves and stems : *Puccinia Asparagi* DC. (Rust). Moshi, 14.11.35. No. 1572.

Cajanus Cajan (*L.*) *Millsp.* (*C. indicus* Spreng.). (Pigeon Pea).

In seed : *Nematospora Coryli* Pegl. Shinyanga, July 1930. No. 1400.

Canavalia ensiformis *DC.* (Sword Bean).

On leaves : *Cercospora* sp. not det. Moshi, 14.7.32. No. 1515. It does not appear to be *C. Canavaliae* Syd.

On collar and pods : *Sclerotium Rolfsii* Sacc. Kasulu, 25.4.32. No. 1472.

Capsicum annuum *L.* (Chilli Pepper).

On collar : *Sclerotium Rolfsii* Sacc. Moshi, 15.7.32.

Carica Papaya *L.* (Papaw).

Disease of leaves very like virus. Morogoro, 13.6.31. No. 1412.

Ceiba pentandra *Gaertn.* (Kapok).

In roots : *Ustulina zonata* Lév. Usambara Mtns., Aug. 1935.

~~**Cineraria sp.**~~ *Melampsorella elatina* Kf: 81,35 of 8.9.3

On leaves : *Aecidium* sp. Moshi District, 9.12.35. No. 1580.

Citrus aurantifolia (*Christm.*) *Swingle* (Lime).

On leaves: *Cephaleuros mycoidea* Karst. Morogoro, 15.5.31. No. 1410.

C. Aurantium *L.* (Orange).

In fruit: *Diplodia gossypina* Cooke, *Penicillium digitatum* Sacc., *Phytophthora palmivora* Butler, *Polyopeus* sp. Muhesa, 1933.

On leaves: *Sporotrichum Citri* Butler (Scab). Muhesa, Aug. 1935. No. 1563; Ring Blotch (physiological). Iringa Prov., Sept. 1934, No. 1554.

Coffea arabica *L.* (Coffee).

In beans: *Nematospora Gossypii* Ashby & Nowell, Moshi, Nov. 1931. No. 1457.

On cherries: *Botrytis* sp. (Warty disease). Usambara Mtns., 8.7.35. No. 1564.

Collar dry rot (associated with Mealy Bug, *Pseudococcus brevispinosus*, syn. *P. bromeliae*.—ident. A. H. Ritchie), Usambara Mtns., Feb. 1934. No. 1546.

On collar, leaves and cherries: *Fusarium lateritium* Nees var. *longum* Wr. (Fusaria autographice delineata, No. 964). Usambara Mtns., 1932, Coll. H. H. Storey. *F. Solani* var. *eumartii* (Carp.) Wr. Usambara Mtns., 1932, Coll. H. H. Storey. (cf. *Ann. Appl. Biol.* xix, 1932). Both det. Dr. Wollenweber.

C. liberica *Bull. ex Hiern.*

On leaves: *Cephaleuros mycoidea* Karst. Bukoba, July 1931. No. 1421.

Cymbopogon citratus *Stapf* (Lemon Grass).

On leaves: *Puccinia Cymbopogonis* Mass. (Rust). Moshi, 7.9.35. No. 1570.

Dahlia sp.

On leaves: *Entyloma Dahliae* Syd. (Leaf Spot). Lushoto, 17.8.32. No. 1513.

Helianthus annuus *L.* (Sunflower).

On leaves: *Erysiphe Cichoracearum* DC. (Mildew). Moshi, 21.7.32. No. 1509.

Hibiscus esculentus *L.* (Okra).

On old fruits: *Myrothecium roridum* Tode, Morogoro, 21.5.32. No. 1477.

Hordeum vulgare *L.* (Barley).

In ears: *Ustilago Hordei* (Pers.) Lagerh. (Covered Smut). Iringa Prov., June 1934. No. 1579.

On leaves: *Helminthosporium teres* Sacc. (Net Blotch). Usambara

Mtns., 17.8.32. No. 1512. Det. N. J. G. Smith. *Puccinia anomala* Rostrup (Brown Rust). Usambara Mtns., 12.7.35. No. 1576.

Lens esculenta *Moench* (Lentil).

On leaves: *?Erysiphe Polygoni* DC. (Mildew). Morogoro, July 1935. No. 1575.

Manihot utilissima *Pohl.* (Cassava).

On leaves: *Mycosphaerella Manihotis* Ghesq. & Henrard non Sy (probably). Muhesa, 4.7.32. No. 1521.

On stems: *Botryodiplodia Manihotis* Syd. Tanga, 1.7.32. No. 1520.

Nicotiana Tabacum *L.* (Tobacco).

On leaves: *Cercospora Nicotianae* Ell. & Ev. (Frog-eye Spot). Tunduru, June 1931. No. 1423. Det. J. C. Hopkins; Leaf Curl (virus). Morogoro, 15.9.31. No. 1433. Det. T. W. Kirkpatrick; Blackfire (physiological). Iringa Prov., May 1935.

Systemic diseases: *?Bacillus carotovorus* L. R. Jones (Hollow-Stalk). Iringa Prov., April 1935; *Bacterium Tabacum* Wolf & Foster (Wildfire). Songea, May 1934. No. 1540. Det. J. C. Hopkins.

Oryza sativa *L.*, (Rice).

On glumes: *Helminthosporium Oryzae* van Breda (Brown Spot). Pangani, 11.7.32. No. 1527. Det. N. J. G. Smith; *Piricularia Oryzae* Cav. (Blast). Lindi, June 1934. No. 1544.

In grains of ear: *Ustilaginoidea virens* (Cke) Tak. (False Smut). Kilosa, 24.6.32. No. 1497.

Pennisetum spicatum *Koern.* (Bulrush Millet).

On leaves and ears: *Sclerospora graminicola* (Sacc.) Schroet. (Downy Mildew and Green-ear disease). Mwanza, February and March 1932. No. 1455 and 1471.

In ears: *Tolyposporium Penicillariae* Bref. (Smut). Tanga, 2.7.32. No. 1494.

Persea Americana *Mill.* (Avocado).

On leaves: *Cephaleuros mycoidea* Karst. Morogoro, May 1931. No. 1411.

Cankers on stem, branches, and twigs: Morogoro, Oct. 1934.

Phaseolus lunatus *L.* (Lima Bean).

On leaves: *Ascochyta Phaseolorum* Sacc. (Blotch). Iringa Prov., June 1935. No. 1558.

P. mungo *L.* (Gram).

On leaves: *Cercospora* sp. Kilosa, May 1932. No. 1480.

Physalis peruviana *L.* (Cape Gooseberry).
On leaves: *Entyloma Physalidis* (Kalchbr. & Cooke) Wint. Morogoro, 28.7.31. No. 1418. Det. E. M. Doidge.

Pisum sativum *L.* (Pea).
On leaves etc.: *Erysiphe Polygoni* DC. Lushoto, August 1932. No. 1533.

Poinciana regia *Boj.* (Flamboyante).=*Delonix regia* Raf.
In roots: *Ustulina zonata* Lév. Morogoro, March 1934.

Prunus Amygdalus *Stokes* (Almond).
In roots: *Bacterium tumefaciens* E. F. Sm. & Towns. (Crown Gall). Iringa Prov., June 1934. No. 1538.

P. domestica *L.* (Plum).
In roots: *B. tumefaciens* E. F. Sm. & Towns. (Crown Gall). Usambara Mtns., July 1935.
On leaves: *Puccinia Pruni-spinosae* Pers. (Rust). Usambara Mtns., July 1935. No. 1578.

P. Persica *Stokes* (Peach).
In roots: *B. tumefaciens* E. F. Sm. & Towns. (Crown Gall). Usambara Mtns., July 1935.
On leaves: *Taphrina deformans* (Berk.) Tul. (Leaf Curl). Iringa Prov., June 1934. No. 1537.

Pyrus communis *L.* (Pear).
In roots: *B. tumefaciens* E. F. Sm. & Towns. (Crown Gall). Usambara Mtns., July 1935.

P. Malus *L.* (Apple).
In roots: *B. tumefaciens* E. F. Sm. & Towns. (Crown Gall). Usambara Mtns., July 1935.

Rosa sp.
In roots: *B. tumefaciens* E. F. Sm. & Towns. (Crown Gall). Moshi, 1932.

Saccharum officinarum *L.* (Sugar Cane).
On leaves: *Leptosphaeria Sacchari* van Breda. Pangani, 11.7.32. No. 1519.
On leaves, sheaths and stems: *Pleocyta Sacchari* (Mass.) Petr. & Syd. Mkiyuni, 8 & 9 June, '32; Pangani, 11.7.32. Nos. 1489, 1500, 1518.

Secale cereale *L.* (Rye).
On leaves: *Puccinia secalina* Grove (Brown Rust). Usambara Mtns., 17.8.32. No. 1511.

Sesamum orientale *L.* (Sesame).

On leaves: *Cercospora Sesami* Zimm. Morogoro, 12.5.32. No. 1476; *Helminthosporium gigasporum* B. & Br. subsp. *javanicum* Penz. & Sacc. (provisionally). Morogoro, 1.6.32. No. 1481; *Oidium erysiphoides* Fr. (Mildew). Morogoro, 12.5.32. No. 1475; Leaf Curl (probably virus). Morogoro, 1.6.32. No. 1483.

Solanum Lycopersicum *L.* (Tomato).

Systemic disease: Mosaic (virus). Moshi Dist., May 1935. No. 1574.

S. Melongena *L.* (Egg Plant).

On leaves: *Aecidium* sp. (Rust). Moshi Dist., 29.10.35. No. 1571.

S. tuberosum *L.* (Potato).

In tubers: " Spraing." Arusha, April 1932. No. 1468. Det. G. H. Pethybridge.

Sorghum vulgare *Pers.* (Guinea Corn).

On leaves: *Sclerospora Sorghi* (Kulk.) Weston & Uppal (Downy Mildew). Mwanza, February 1932. No. 1456.

On leaves of young plants: *Ascochyta sorghina* Sacc. Morogoro, 5.3.32. No. 1458.

In grains: *Sphacelia Sorghi* McRae (" Asali disease ") and *Cerebella Sorghi-vulgaris* Subram. near Kilosa, 21.6.32. No. 1490; *Tolyposporium Ehrenbergii* (Kühn) Pat. (Smut). Shinyanga, May 1933. No. 1535.

Tephrosia Vogelii *Hook. f.*

In seeds: *Nematospora Coryli* Pegl. Morogoro, 28.7.30. No. 1401.

Thea sinensis *L.* (Tea).

On leaves: *Cephaleuros mycoidea* Karst. Tukuyu, 21.10.32. No. 1462.

On twigs: *Stilbella Theae* Bernard. Tukuyu, December 1931. No. 1441.

Theobroma Cacao *L.* (Cacao).

On dead branches and pods: *Nectria Jungneri* P. Henn. Usambara Mtns., 24.9.32. No. 1508; *Botryodiplodia Theobromae* Pat. Usambara Mtns., 7.7.32. No. 1499.

In pods: *Phytophthora* sp. Usambara Mtns., 7.7.32.

In roots: *Ustulina zonata* Lév. Usambara Mtns., August 1935.

On old stumps: *Kretzschmaria cetrarioides* (Welw. & Curr.) Sacc. Usambara Mtns., 7.7.32. No. 1496.

Triticum vulgare *Vill.* (Wheat).

On glumes : *Bacterium translucens* var. *undulosum* Smith, Jones, & Reddy (Black Chaff). Iringa Prov., August 1935. No. 1577. Det. J. McDonald.

On leaves : *Epicoccum purpurascens* Ehrh. Iringa Prov., August 1935. No. 1568 ; *Puccinia triticina* Erikss. (Brown Rust). Iringa Prov., July 1931. No. 1419.

On leaves and glumes : *Septoria nodorum* Berk. (Glume Blotch). Iringa Prov., June 1934. No. 1543.

Verbena sp.

On leaves : *Erysiphe Cichoracearum* DC. (Mildew). Lushoto, 17.8.32. No. 1510.

Vitis vinifera *L.* (Grape Vine).

On leaves : *Uncinula necator* (Schw.) Burr. (Mildew). Uluguru Mtns., 10.12.32. No. 1528.

On leaves and fruit : *Plasmopara viticola* (Berk & Curt.) Berl. & de Toni (Downy Mildew). Ruvu, 29.3.34. No. 1536.

Voandzeia subterranea *Thou.* (Bambarra Groundnut).

On roots and fruit : *Sclerotium Rolfsii* Sacc. Morogoro, 16.6.32. No. 1488.

On leaves : *Erysiphe Polygoni* DC. (Mildew). Bukoba, 18.4.32. No. 1473.

Zea Mays *L.* (Maize).

In ears and tassels : *Sorosporium Reilianum* (Kühn.) McAlp. (Head Smut). Uluguru Mtns., above 5000 ft., 29.3.32. Nos. 1460 & 1461.

In ears and on old stalks : *Gibberella Saubinetii* (Mont.) Sacc. Morogoro, 18.1.32. No. 1444 ; *Fusarium moniliforme* Sheld. (*Gibberella moniliformis* (Sheld.) Winel.). Morogoro, January 1932. Cultures Nos. 61 & 106 ; *Diplodia Frumenti* Ell. & Ev. Mkiyuni, 9.6.32. Nos. 1486-7 ; *D. macrospora* Earle. Morogoro, 23.1.32. No. 1447 ; *D. Zeae* Lév. Morogoro, 23.1.32. No. 1449.

On old stems : *Clasterosporium Lindavianum* Reichert, Moshi, 15.7.32. No. 1507 ; *Leptosphaeria eustoma* (Fr.) Sacc. forma *Zeae* Berl. Morogoro, 20.1.32. No. 1446 ; *L. orthogramma* Sacc. Moshi, 15.7.32. No. 1501.; *Nigrospora sphaerica* (Sacc.) Mason. Morogoro, 31.8.31. No. 1429 ; *Papularia sphaerosperma* (Pers.) von Höhn. (group) Moshi, 15.7.32. No. 1504.; *Papularia vinosa* (Berk. & Curt.) Mason. Morogoro, 23.1.32. No. 1450 ; *Phaeocytostroma ambigua* (Mont.) Petr. Morogoro, 23.1.32. No. 1448.

Entomogenous Fungi

Entomophthora Aphidis Hoffm. Parasitic on *Aphis leguminosae* on *Arachis hypogaea*. Coll. H. H. Storey, 1932.

Tetracium coccicolum von Höhn. (the conidial stage of *Podonectria*

coccicola (Ell. & Ev.) Petch. Parasitic on scale insects on leaves and twigs of *Citrus* sp. Muhesa, 4.7.32.

Sphaerostilbe aurantiicola (B. & Br.) Petch, Muhesa, 4.7.32. No. 1522. Parasitic on scale insects on leaves and twigs of *Citrus* sp. The conidial stage (*Microcera aurantiicola* Petch) was present, but scanty.

Armillaria

Living host-plants of *Armillaria* sp. in Tanganyika Territory, in addition to coffee and tea recorded in Preliminary List, are as follows: [*A. mellea* (Vahl.) Quél. was identified from dead stumps of forest trees.]

Acacia Cunninghamii Hook. *A. dealbata* Link (Silver Wattle). *A. decurrens* Willd. (Black Wattle). *Acacia* sp. (Indig.). *Acrocarpus fraxinifolius* Wight & Arn. *Albizzia moluccana* Miq. *Cajanus Cajan* Millsp. (Pigeon Pea). *Calodendron* sp. *Cedrela odorata* L. *C. Toona* Roxb. ex Rottl. *Chlorophora excelsa* Benth. & Hook. f. ("Mvule"). *Citrus Aurantium* L. (Orange). *C. Limonum* Risso (Lemon). *Crotalaria* sp. *Cupressus lusitanica* Carr. *Cyphomandra betacea* Sendt (Tree Tomato). *Eucalyptus citriodora* Hook. *E. globulus* Labill. *Erythrina lithosperma* Blume. *Grevillea robusta* A. Cunn. *Hibiscus Rosa-sinensis* L. *Jacaranda* sp. *Manihot utilissima* Pohl (Cassava). *Musa sapientum* L. (Banana). *Rosa* sp. *Saccharum officinarum* L. (Sugar Cane). *Sesbania* sp. *Trema guineensis* Priem. *Widdringtonia Whytei* Rendle (Mlanje Cedar).

XXIV—MISCELLANEOUS NOTES.

Dr. Tempany.—Dr. H. A. Tempany, C.B.E., Director of Agriculture in the Straits Settlements, has been appointed Assistant Agricultural Adviser to the Secretary of State for the Colonies.

Cultivated Crop Plants*.—The aim and scope of this work is briefly indicated in the foreword, as follows:—

"This is the first attempt that has been made to furnish information showing the distribution of Tropical and Sub-tropical crop plants in the British Empire, and its compilation has been undertaken n the belief that it will prove of value, especially to the officers of the several Departments of Agriculture concerned. It is hoped

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*"Cultivated Crop Plants of the British Empire and of the Anglo-Egyptian Sudan (Tropical and Sub-tropical); Based on information which has been supplied by the Departments of Agriculture concerned". By H. C. Sampson, C.I.E., B.Sc., F.L.S., Economic Botanist, Royal Botanic Gardens, Kew; Indian Agricultural Service, Retd. Royal Botanic Gardens, Kew, Bulletin of Miscellaneous Information, Additional Series XII. London. H. M. Stationery Office, 1936. Pp. viii + 251. Price 6*s.* 6*d.*

that it may stimulate the trial of new crops, and more especially the trial of other varieties of crops already under cultivation.

With this latter object in view, a series of notes has been compiled which, it is expected, will be of use to those engaged in studying and comparing the varieties of crop plants. Space has of necessity limited the number of crops which can be so dealt with, and those selected are, in the main, the staple foods of the Tropics and Subtropics on which the indigenous peoples of the British Empire are dependent for their livelihood and existence ".

An inventory of this type was asked for by the Conference of Colonial Directors of Agriculture in 1931. The information on which it is based was received in reply to a questionnaire sent from Kew to the relevant government departments in all Tropical and Subtropical countries of the British Empire and in the Anglo-Egyptian Sudan. Under each species are given the native country (where known), local names, and a classified list of countries in which the species is or has been grown, indicating its status in each country, (*e.g.* successfully introduced : still under trial : etc). Full information on the distribution of all important Tropical crops is thus made available. A list of commonly-used synonyms appears as an appendix.

The Extra Pharmacopoeia.*—The second volume of the twentieth edition of this well-known work has now appeared. After the death of Dr. Martindale in 1933, the Pharmaceutical Society purchased all rights in " The Extra Pharmacopoeia " and the editor of the " British Pharmaceutical Codex (1934) " was appointed editor of it. This arrangement should enable progressive revision of the two books to be carried out and maintain their complementary character. Furthermore, it is fitting that the work should have been adopted by a body with no direct commercial interests, and with medical, pharmaceutical, chemical and other experts available.

The work has been issued in two volumes since the 15th edition in 1912, volume 1 containing matter dealing with treatment by drugs and chemicals, and volume 2 with information on analysis, bacteriology, diagnosis, sterilisation, etc.—subjects ancillary to therapeutics. The present edition of volume 2 is based on the same general principles as other recent editions. Certain minor changes, however, have been made. These include the addition of a good deal of new information that has appeared as a result of recent research.

A number of vegetable drugs are referred to under the section " Analytical Addenda to Materia Medica in Vol. 1.," which occupies over 200 pages of the book. The information that appears there naturally varies with the nature of the drug-plant in question and what has already been given in regard to it in complementary works.

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* " The Extra Pharmacopoeia of Martindale and Westcott." Twentieth Edition. Volume II. The Pharmaceutical Press, 23 Bloomsbury Square, London, W.C.1. 1935. Pp. xxxiv + 889. Price 22*s.* 6*d.* net.

In this section inconsistency has arisen in the use of authorities with botanical names. They are quoted in some instances but not in all. The volume is attractively printed and bound and contains an astonishing amount of information for it small size.

F. N. HOWES.

Apples and Pears.*—This book of 213 pages is the official report of the Conference on Apples and Pears organised by the Royal Horticultural Society and held at the Crystal Palace from the 19th to 21st September, 1934.

The book commences with a list of the Conference Committee, followed by the opening address given by Lord Aberconway, C.B.E., President of the Society.

Among the ten papers read during the three days of the conference, all of which are printed in full, mention might be made of the following :—

" The Basis of Classification of Apples and Pears," by Mr. E. A. Bunyard, Chairman of the Conference Committee. " The fruit Trials at Wisley," by Sir Daniel Hall. " New Varieties of Apples and Pears." by Mr. A. N. Rawes. " The Fruit the Public Wants," by Mr. H. L. Taylor. " Stocks for Pears," by Mr. R. G. Hatton. An excellent paper, prepared for but not read at the conference, on " Pollination of Apples, Pears and Plums " is also published.

In conjunction with the conference, an endeavour was made to collect together as many varieties as possible of apples now grown in this country. A list of the varieties shown, approximately 1,000 in number, with notes is printed on pp. 185-203. A comprehensive collection of cider apples was also exhibited, details of which are given.

The book, which is illustrated with plates and figures, will be found a most useful compilation by all who are interested in apples and pears whether grown commercially or for domestic consumption.

Colloids in Agriculture.†—It is desirable that those interested in the applications of science to agriculture should be familiar with the nature and chemical behaviour of colloids, which play so large a part in the structure of the soil, in the metabolism of living organisms, and in other more specialised departments such as the chemistry of milk, insecticides, etc. The author of the present volume expresses the hope that it will be of use to county organizers, district lecturers and rural instructors, and to agricultural students. It is divided into three parts. In the first the nature and behaviour

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* " Apples and Pears : Varieties and Cultivation in 1934." The Report of the Conference on Apples and Pears held by the Royal Horticultural Society, September, 1934. The Royal Horticultural Society Vincent Square, London, S.W.1. Pp. iv+213. Price 7*s.* 6*d.*

† By C. E. Marshall, M.Sc., Ph. D. Edward Arnold & Co., London, 1935. Pp. vi + 184. 5/- net.

of colloidal substances are outlined; part 2 is devoted to colloids in the soil, and in part 3 colloids which are components of living organisms are discussed.

Those who are not well-versed in physical and organic chemistry usually find the subject of colloids somewhat abstruse, as is amusingly stated in the preface. The author has attempted to overcome this difficulty by writing in as simple language as possible, and by illustrating his points by reference to subjects with which agriculturists are familiar in everyday life. This has been well done, but even so, from its very nature, much of the subject matter will be far from easy reading for the majority of agriculturists, and the book will probably be found most useful by fairly advanced students.

C. R. METCALFE.

Botanical Magazine.—The first part of vol. 159 was published on February 29th and contains the following plant portraits:—*Arisaema Pradhanii* C. E. C. Fischer (t.9425), a remarkable aroid found at Jalook, Sikkim, allied to *A. Griffithii* Schott with a spathe almost like burnished metal; *Hymenanthera crassifolia* Hook. f. (t.9426), the remarkable shrubby New Zealand "violet" distinguished for its snowy white or purple-tinged glistening berries; *Synthyris stellata* Pennell (t. 9427), a native of the north-western United States; *Dendrobium hercoglossum* Reichb. f. (t.9428), from Siam; *Decumaria sinensis* Oliver (t.9429), the Chinese representative of this interesting genus, the only other species, *D. barbara* L., being native in the south-eastern United States; *Rhododendron longesquamatum* Schneider (t.9430), from Szechwan, China; *Lotus aegaeus* (Griseb.) Boiss. (t.9431), a native of the Balkan Peninsula; *Glaucidium palmatum* Sieb. & Zucc. (t.9432), a monotypic genus of *Podophyllaceae* endemic in Japan, nearly allied to the monotypic *Hydrastis canadensis* L. (see Bot. Mag. tt. 3019, 3232) of the north-eastern United States; *Lachenalia mutabilis* Sweet (t.9433) from South Africa, introduced to this country over 100 years ago; *Cupressus lusitanica* Mill. (t.9434), a native of the high mountains of Mexico and Guatemala; and *Delphinium Consolida* L. subsp. *paniculatum* (Host) Turrill (t. 9435), a dainty larkspur from south-eastern and southern Central Europe and Asia Minor, with a much involved synonymy, the name here given being a new combination.

Everyday and Intermediate Botany.*—These two textbooks together cover the syllabuses of examinations of School and Higher School Certificate standard. This does not imply, however, that what may be called the "exam. outlook" is encouraged by the author. On the contrary, in his preface to the later book he writes:

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* "Everyday Botany" by L. J. F. Brimble. Macmillan & Co. Ltd., London, 1934. Pp. vii + 589. Figs. 340. Price 7s. 6d. "Intermediate Botany," by L. J. F. Brimble. Macmillan & Co. Ltd., London, 1934. Pp. vii + 562. Figs. 337. Price 8s. 6d.

" While, however, the requirements of these examinations have been borne constantly in mind during the preparation of the book, an endeavour has been made to present botany as a coherent and developing study of high value in scientific training and also of importance in its contacts with everyday life." In other words, since examinations exist, they cannot be ignored, but their requirements should not be catered for to the exclusion of the broader cultural approach to the subject.

These precepts the author has embodied in the two volumes under review. In " Everyday Botany," especially, the economic aspect of the subject is stressed in such a way that those beginning the study of botany will appreciate from the outset its relationship with human needs and activities. Both volumes are profusely illustrated by photographs, drawings and diagrams, many of which were prepared by the author.

Insect pests of Glasshouse Crops.*—This comprehensive work on insect pests of glasshouses is written in a simple and concise manner, and will certainly prove of great value to both private and commercial growers. The book is divided into nine chapters and is excellently illustrated by 21 plates and 15 text figures. Chapter I is devoted to the effects of glasshouse conditions on the occurrence and control of pests. The following seven chapters deal with soil pests, caterpillars, aphides, white-fly, thrips, eelworms, woodlice and miscellaneous pests. The life cycles of many species are briefly described, and the various plants on which they prey, the methods of control and prevention, are given in full. The final chapter is devoted to the methods of controlling the pests in glasshouses. Such methods as soil sterilization by heat, the chemical treatment of soil, the fumigation of glasshouses, humidity in relation to fumigation, and various insecticides are described.

The appendix consists of a valuable alphabetical list of glasshouse plants, with associated pests, and characteristic injury.

With the exception of two or three small errors in the spelling of plant names (*Irisine* for *Iresine*, and *Chorozima* for *Chorizema*) the book is very free from misprints.

Dr. H. W. and Mrs. Miles, and Mr. H. C. Long, who is both editor and publisher, are to be congratulated on the production of a much-needed handbook to this important aspect of horticulture.

L. STENNING.

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* By H. W. Miles and M. Miles. With a Foreword by J. C. F. Fryer. Edited and Published by H. C. Long. 1935. Pp. 174. Price 8s. 6d. (by post 9s.).

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